Motorship

"A National Trade Journal"

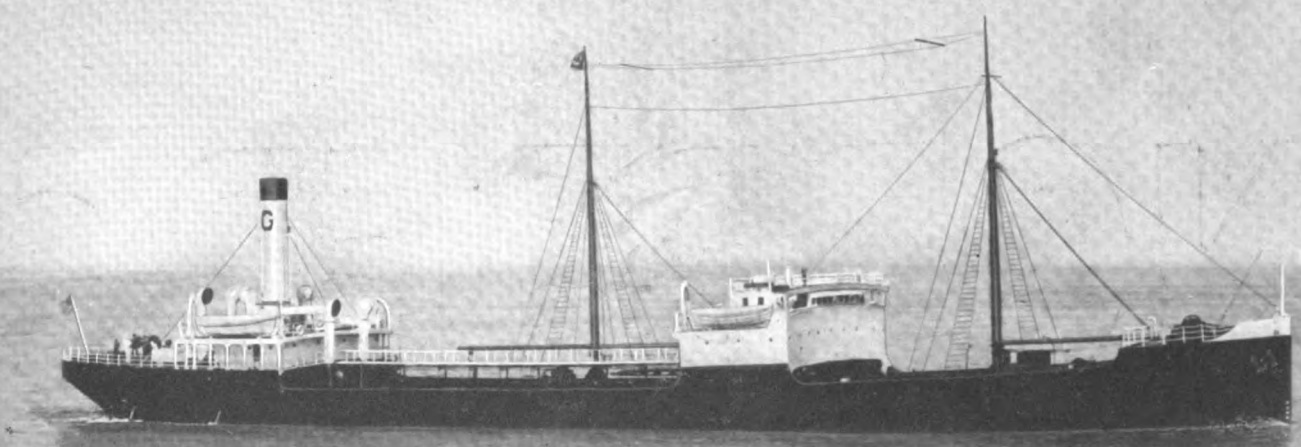
Registered in U. S. Patent Office and abroad

This tanker became profitable only after equipping with high-grade Diesel engines

THE 292-ft. Motorship "Los Alamos" became a satisfactory carrier only after smaller surface-ignition type engines were replaced with two sturdy dependable 950-i. hp. McIntosh & Seymour Diesels. Since the replacement, she has handled cargoes of oil between American, European and Far Eastern ports and has shown herself well able to meet every demand.

Sustained low fuel rate, uninterrupted running good maneuvering qualities and freedom from machinery annoyances are outstanding characteristics of

McINTOSH & SEYMOUR MOTOR SHIPS



McINTOSH & SEYMOUR CORPORATION, AUBURN, N. Y.

SEPT., 1928 PRICE 35c.

Motorship

Registered in U. S. Patent Office and abroad

"A National Trade Journal"

T. Orchard Lisle
Executive Editor and General Manager

Roswell H. Ward, *Managing Editor*
William B. Rogers, Jr., *Promotion Manager*
A. B. Newell, *Associate Editor*
James F. Wells, *Circulation Manager*

Principal Contents

NATIONAL TRADE JOURNALS, *Inc.*

CANNING AGE
CANDY GAZETTE
FISHING GAZETTE
BUTCHERS' ADVOCATE
NATIONAL CLEANER & DYER

101 West 31st Street, New York
Heman J. Redfield *President and Treasurer*
Joseph E. Browne *Vice President and General Manager*
John Thomas Wilson *Vice President and Editor-in-Chief*

MOTORSHIP
MOTOR BOAT
BUILDING AGE
OIL ENGINE POWER
SPORTING GOODS JOURNAL
CEMENT MILL & QUARRY

Progress That Is Irresistible

CONSISTENTLY, unfalteringly, this magazine has stood for the progress represented by the Diesel-driven ship. MOTORSHIP'S volumes of the last 12 years bear witness to the incessant fight we have waged for proper recognition by American shipowners of the economic advantages of the new style vessel. We feel proud that it has largely been due to our efforts that the United States today stands third—according to Lloyds—in the list of motorship-owning countries, with a total of 260 Diesel vessels, aggregating nearly 500,000 gross tons, led only by the United Kingdom and Norway. Yet this country has not made the motorship progress that it would have made if our editorial efforts had not been combated by the devotion displayed towards steam in other quarters. In not straddling the issue MOTORSHIP has been alone. We have been unequivocally for the Diesel-engined vessel. We have never tried to serve two masters simultaneously and "play make-believe," giving of an unbiased story of the Diesel-engined ship with no axe to grind. We *have* been grinding an axe, and have produced a keen edge that has cut sharply.

Consistently we have forecast motorship development in all its phases with a clear discernment that has always been eventually proved correct. Years ago we prognosticated the higher ship speeds that the latest motorships have now almost universally attained. We demonstrated that the Diesel oil engine would grow from the modest freighter class into the larger express freighters of the combination passenger-and-freight type, at the same time eating down into the workboat and yacht. That it would completely revolutionize transocean and intercoastal cargo carrying by making speeds of 14, 15 and 16 knots possible and economical. And, would then rapidly expand into the small passenger-liner field and subsequently into the liner field. This theme can be found running through our editorial pages of ten years ago as well as today. Never has MOTORSHIP let up on its efforts. The motorship is reaching now to the zenith, and the feature article in this issue reveals this fact with striking force and clarity.

With the courage that comes from conviction so well founded and supported, we bid the more conservative of American shipowners to accelerate their progress by giving early heed to the evidence of motorship superiority. Cargo carrying ship speeds of 17, 18 and even 20 knots will be with us within another five years—a speed impractical and not economically possible with steam. Some of these near future ships may be burning $3.00 per ton coal-dust in their Diesel engines, and only consuming 50 tons per day for each 10,000 horsepower developed. Where then will be the 14-knot steamers several American shipowners are now planning.

Motorship

Reg. U. S. Pat. Office and abroad. Copyright 1928 by National Trade Journals, Inc.

***Published** on the 25th of the month prior to each title month of issue. **Subscriptions:** U. S. and Mexico, $4; other countries of the Postal Union, $5. **Single** copies 35 cents. Bound volumes of previous years, $10. Main Office: 101 West 31st Street, New York, N. Y.*

Changes in advertising copy must be received by the publisher 3 weeks prior to the date of publication when proofs are desired, and orders for discontinuance of advertising must be received not later than the 1st of the month prior to the title month of issue.

Volume XIII — *September, 1928* — *Number 9*

Dominance Among Largest Liners Now Passing to Motorships

Swift Rise of Diesel Liners in Passenger Shipping Revolutionizes Future of World's Biggest Steam Vessels

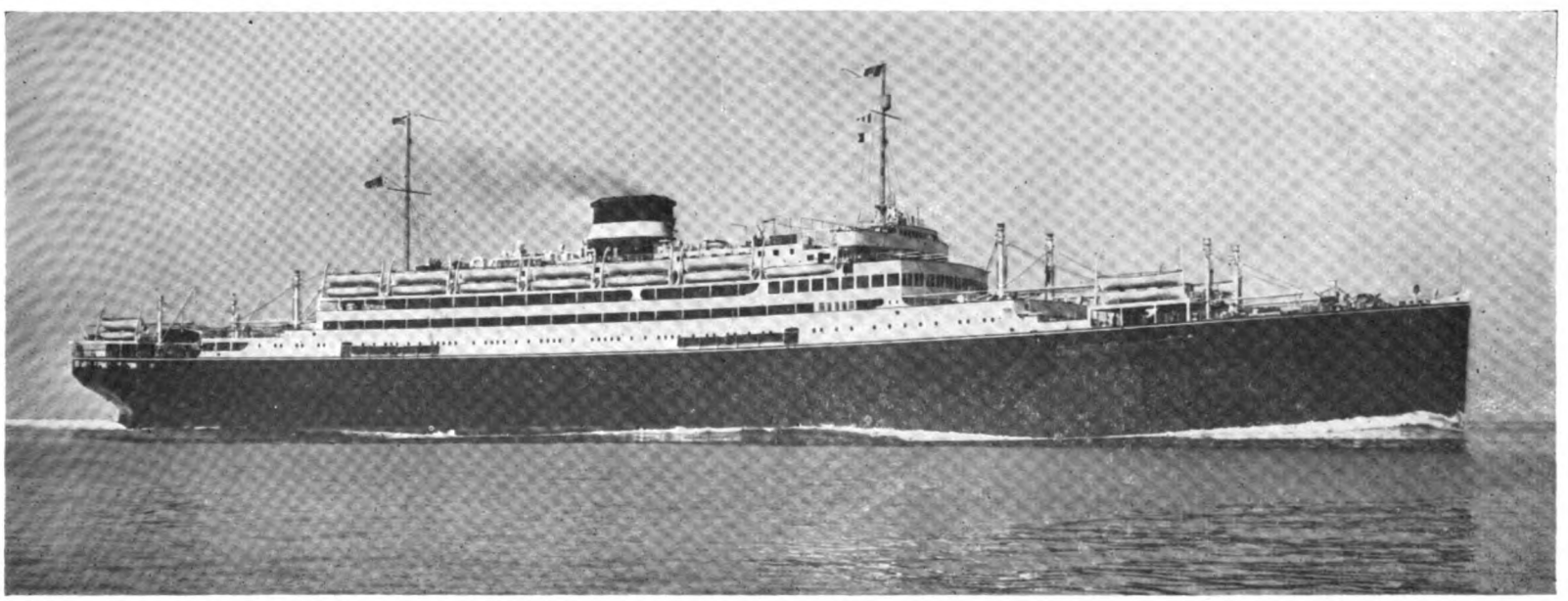
By R. W. Crowly

HOLDING ninth position among the largest vessels in the world, the biggest Diesel motorliner now outranks many famous transatlantic steamers and surpasses even, the renowned MAURETANIA in point of gross tonnage. Outside the Big Six, an *élite* class 10,000 tons and more ahead of the rest of the world's shipping, the motorliner AUGUSTUS has only two rivals, the S.S. PARIS and the S.S. HOMERIC.

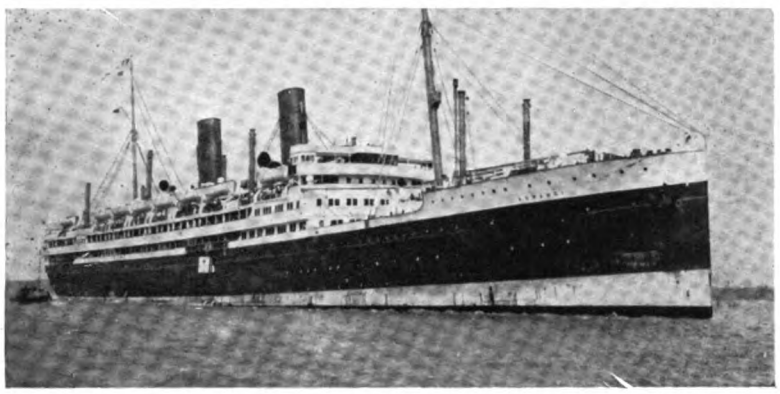
In that exalted position the big Italian motorship leads everything else afloat under every flag. She is supreme over all the other Cunard, French Line, White Star and American flag vessels. She is superior to the present biggest of the German liners. She is ahead of all the other finest liners on the Atlantic and Pacific Oceans.

In the list of vessels exceeding 25,000 tons gross there are two motorliners. Taking precedence over America's second largest vessel, the S.S. GEORGE WASHINGTON of the United States Lines, are four motorliners. Exceeding the size of America's largest domestic-built boats, the S.S. CALIFORNIA and the S.S. VIRGINIA, of the Panama-Pacific Line, are seven motorliners. Excelling in gross tonnage the S.S. MALOLO, star vessel of the American merchant marine in the Pacific, are 19 motorliners.

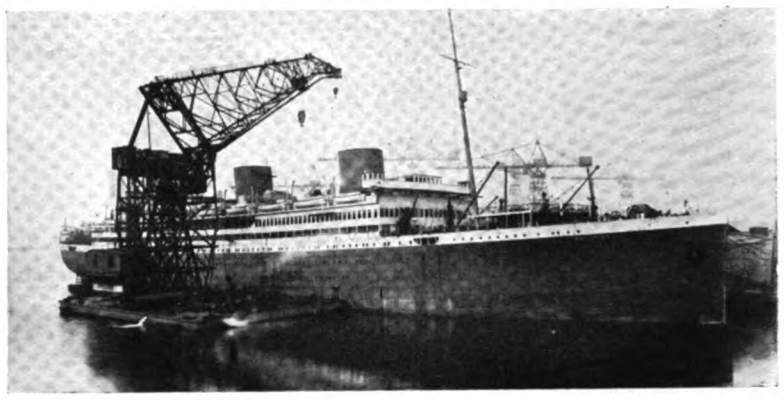
Four years ago not one single motorliner found place among the 100 largest vessels in the world. AORANGI, first of the type, was still at the builder's yard. Today nine large motorliners are in service. Ten more are on order, counting only those which are bigger than the S.S. MALOLO



The modern motorliner has set a new precedent in Transatlantic passenger transportation while America lags years behind. The Saturnia, one of two Diesel-driven liners for the Cosulich Line, is just as excellent in operation as she is in appearance



New Zealand motorliner Aorangi has covered over 300,000 *miles in Transpacific service, with remarkable reliability*



The British built Asturias showed her superiority to Americans, two years ago, when she ran on a cruise from New York

and which excel the two earliest large motorliners, AORANGI and GRIPSHOLM.

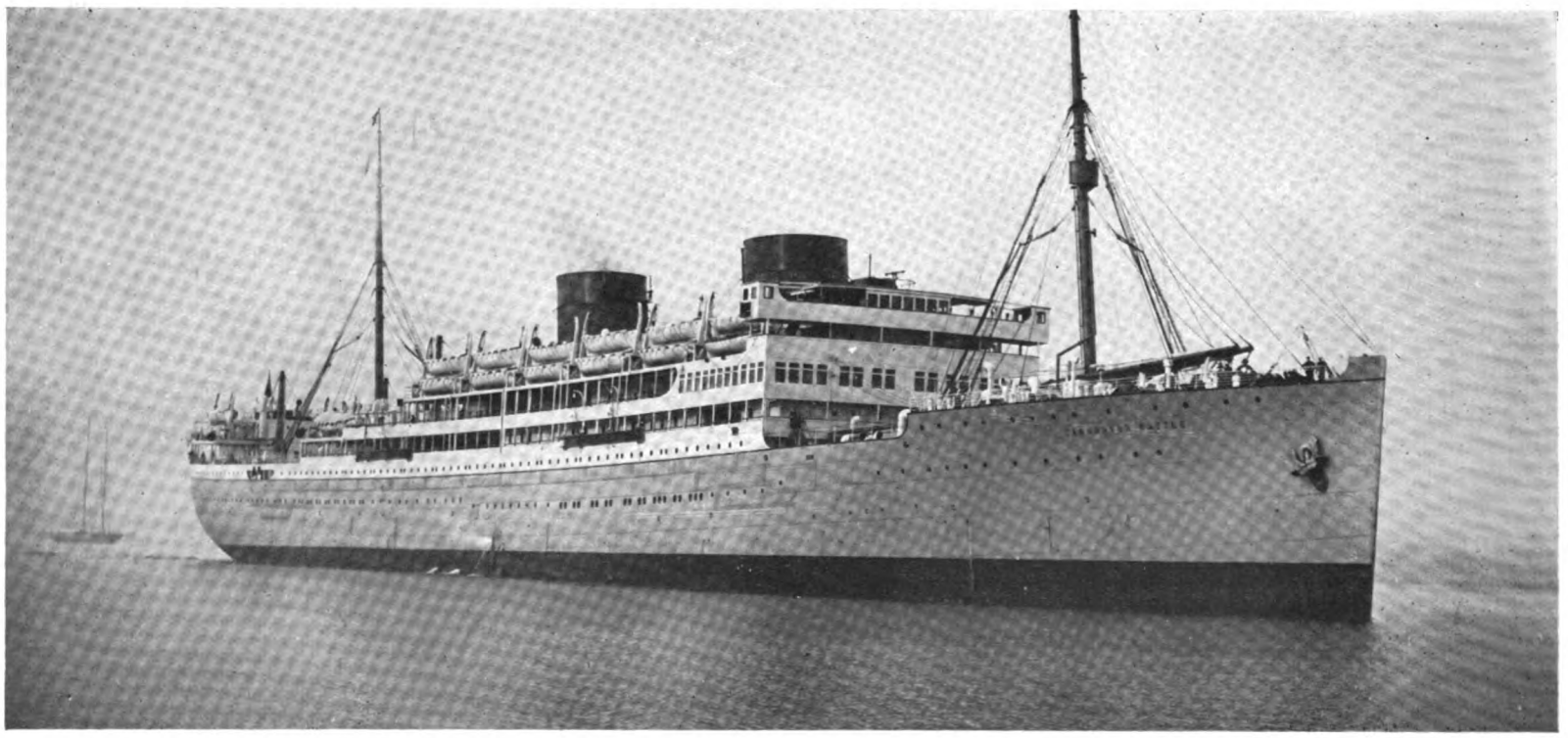
Look at the list of the world's largest vessels afloat and under construction. See where the motorliner has carved its mark in the short space of four years. It has captured one quarter of all the places. It has doubled in size and power. From the 17,491 tons gross and 13,000 horsepower of AORANGI in 1924 it has grown to the 32,650 tons gross and 28,000 horsepower of AUGUSTUS in 1928. And the end is not yet, for the motorliner is being seriously considered as the type for the greatest vessel ever ordered, a vessel of 60,000 tons gross which in size and speed will outstrip every one of the Big Six and surpass the two big German liners that are being built with American gold.

Are you skeptical that the premier place in the world's shipping may fall this year to the sweeping onrush of the new style liner? Does it astonish you that the mammoth White Star vessel, which with her 1000 ft. and 27 knots will outshine all ocean rivals, may be Diesel driven? Lord Kylsant, head of the White Star Line, it is who cables MOTORSHIP that the machinery has not yet been selected, neither steam nor Diesel. He has publicly stated that care is being taken to make her the most modern liner ever built.

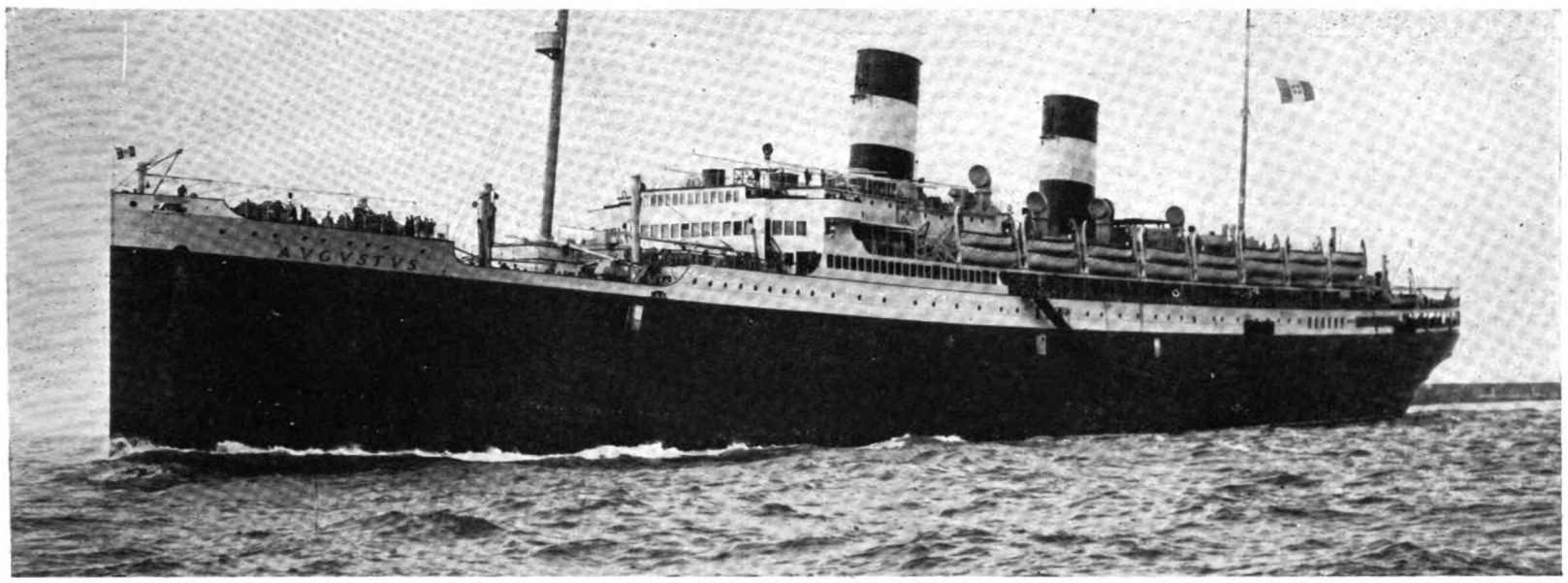
ARE the croakings of critics who have no motorliner operation experience more reliable than the words and actions of Lord Kylsant, who has built three motorliners, each exceeding 20,000 *tons gross, and has had them in operation long enough to know what they are doing? His motorships now number ninety, aggregating over* 560,000 *gross tons. Lord Kylsant also has at his disposal all the White Star Line steam history in its complete form.*

Swiftly indeed has the motorvessel come out of the void of the unknown and leaped to greatness. Movies, radio and aviation, generally termed the greatest achievements of our time, are all older than the motorship, and the automobile was an extra half generation ahead. Before ever there was a Diesel-engined boat, Marconi had spanned the ocean, the Wright brothers had flown, movies had become a public entertainment and automobiles had spread around the world. Faster than any of these has the motorship grown to greatness. What else but sterling economic worth could have speeded it so rapidly to eminence?

Its invasion of the whole, wide sweep of the steamer's erstwhile domain has only just spanned a generation. Roosevelt was still in the White House when the motorship germinated, as the doughty Nobels made of a 30-year old barge the pioneer-Diesel boat. Wilson was nominated the year the brilliantly conceived freighter SELANDIA started the motorship revolution on the ocean. Harding was trying to transfuse life blood into the American merchant marine when the plans of the first big motorliners were being drawn abroad. Coolidge was serving out the last year of the first term when the



It is pitiful that America today lacks a single motorship equivalent to the Ms. Conarvon Castle of the Union Castle Line, or of the larger and more powerful Diesel-driven ocean liners



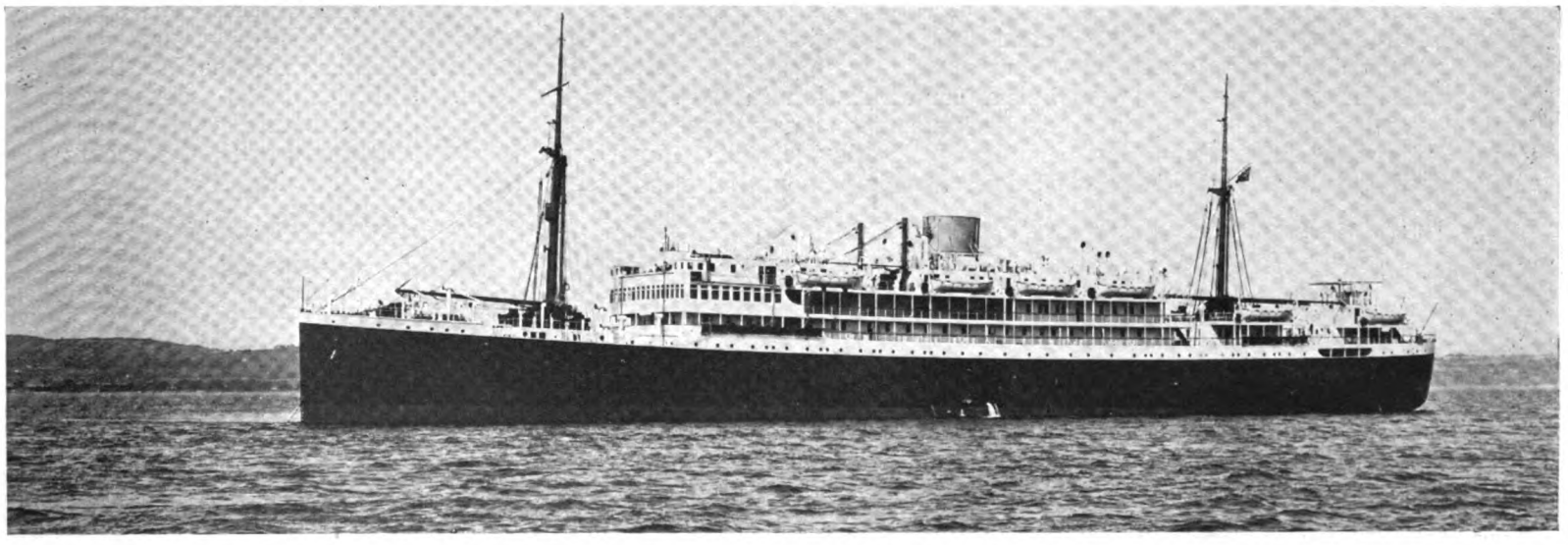
Big Italian motorliner Augustus now outranks many transatlantic steamers, and surpasses the renowned Mauretania in point of gross tonnage

AORANGI led the motorliners into service. In the short space of Coolidge's second term the motorliner has risen to dominate the future of big vessels, with more motorliners than steamliners under contract. So swiftly has the motorliner risen that it has baffled the perception of the old men and the slow men.

Progressive shipowners do not stand still; they advance. When we stand still we go backward, and our slide to the rear is apt to be ridiculously accelerated when the leaders of other nations go ahead as fast as they have done with motorliners. All except two of the foremost shipping companies of the world and nearly all the minor ones with any money have got on the Diesel bandwagon. Some of them it may be objected are still up front on the opposition wagon, and that is true as far as it goes. For instance, the North German Lloyd liners of 46,000 tons gross launched last month are steamers. They are of course to be far more powerful than the biggest motorliner yet built or ordered, needing as they do some 90,000 horsepower or more. Why, it may be asked, are they not to be Diesel-engined if motorliners are sweeping the board? The answer is that only just now has the motorliner advanced to the point of bidding for supremacy above the 30,000 horsepower of the m.s. AUGUSTUS, and the two big German liners were ordered before Lord Kylsant showed that he had the courage to contemplate and study raising the motorliner in one bound from 30,000 horsepower to one hundred thousand. These two new German "sea giants" are having all their auxiliary power produced by Diesel oil engines. This illustrates they recognize the economy of this modern form of power.

SOME shipowners have taken longer than others to work out the figures that have convinced them of the all-around economy and efficiency of Diesel-driven motorships, and the early ones have had to weigh the engineering hazards. But, where is a single one who has failed to proclaim that in going over to the motorship he took the right step? They are men who have tried, who know, and now have their proof.

Steamers are still being ordered, but fewer steamers than motorships. Steamers probably will long continue to be built in the minority now shown, with the trend towards ever dwindling numbers. Always the motorships are cutting down the steamers' field. About three years ago the Hamburg-American Line published figures to show why they had deemed steam superior to Diesel power for their new ALBERT BALLIN class of vessel in the New York trade. Today they manifest a change of heart for the same service. Today the German Admiralty is installing 70,000 s. hp. in eight M.A.N. Diesels in its new battlecruiser. Steam today cannot even rely on the 60,000-ton goliath of the White Star Line for a last support. The writing is on the wall. If she goes steam it will only be because her builders prefer to wait two more years for the sister ship, which as-



Our list of passenger motorliners on page 749 does not include dozens of intermediate size foreign-flagships like the fine Diesel vessel Accra illustrated above. There is one under the Stars and Stripes—the Santa Maria, and she was built abroad

Diesel Motorliners of Over 16,000 Tons Gross in Service or Under Construction

Tonnage and dimensions of motorliners in service are taken from Lloyd's Register.
Dimensions of other vessels are overall length, moulded breadth and moulded depth.

Name of Ship	Gross Register Tons	Length	Breadth	Depth	Engine	Type	No.	S.HP.	Owners
AUGUSTUS	32,650	710.9′	82.8′	46.5′	M.A.N. d-a	6-cyl.	4	28,000	Italian Line
BRITANNIC*	26,000	710′0″	75′6″	52′6″	H. & W. d-a	10-cyl.	2	20,000	White Star Line
VULCANIA*	24,000	599′0″	79′6″	46′6″	Triestina d-a	8-cyl.	2	20,000	Cosulich Line
SATURNIA	23,940	606.2′	79.8′	....	Triestina d-a	8-cyl.	2	20,000	Cosulich Line
ALCANTARA	22,181	630.5′	78.5′	40.5′	H. & W. d-a	8-cyl.	2	15,000	Royal Mail Line
ASTURIAS	22,071	630.5′	78.5′	40.5′	H. & W. d-a	8-cyl.	2	15,000	Royal Mail Line
FRENCH LINER*	22,000	574′2″	75′6″	50′0″	M.A.N. d-a	6-cyl.	4	16,000	French Line
CARNARVON CASTLE	20,063	630.7′	73.5′	41.5′	H. & W. d-a	8-cyl.	2	13,000	Union Castle Line
..... CASTLE*	20,000	655′0″	73′6″	45′6″	H. & W. d-a	8-cyl.	2	13,000	Union Castle Line
..... CASTLE*	20,000	655′0″	73′6″	45′6″	H. & W. d-a	8-cyl.	2	13,000	Union Castle Line
MONTICELLO†	19,361	684.3′	72.3′	40.2′	M. A. N. type	.....	4	28,000	United States
BERMUDA	19,086	525.9′	74.1′	39.6′	Doxford	4-cyl.	4	13,000	Bermuda Line
KUNGSHOLM	19,000	608′4″	78′1″	42′6″	B. & W. d-a	8-cyl.	2	15,000	Swedish Line
.....HOLM*	19,000	608′4″	78′1″	42′6″	B. & W. d-a	8-cyl.	2	15,000	Swedish Line
JOHAN VAN OLDENBARNEVELT*.....	19,000	600′0″	74′0″	....	Sulzer	10-cyl.	2	14,000	Netherlands S.S.
MARNIX VAN ST. ALDEGONDE*.....	19,000	600′0″	74′0″	....	Sulzer	10-cyl.	2	14,000	Netherlands S.S.
MOUNT VERNON†	18,372	685.4′	72.2′	40.5′	M. A. N. type	.....	4	28,000	United States
DEMPO*	18,000	573′0″	70′0″	44′0″	Sulzer	10-cyl.	2	14,000	Rotterdam Lloyd
BALOERAN*	18,000	573′0″	70′0″	44′0″	Sulzer	10-cyl.	2	14,000	Rotterdam Lloyd
GRIPSHOLM	17,716	553.0′	74.4′	37.7′	B. & W. d-a	6-cyl.	2	13,500	Swedish Line
AORANGI	17,491	580.1′	72.2′	43.4′	Sulzer	6-cyl.	4	13,000	Union S. S. of N. Z.
MILWAUKEE*	17,000	540′0″	72′0″	36′6″	M.A.N. d-a	6-cyl.	4	12,400	Hamburg-America Line
ST. LOUIS*	17,000	540′0″	72′0″	36′6″	M.A.N. d-a	6-cyl.	4	12,400	Hamburg-America Line
ASAMA MARU*	16,500	560′0″	72′0″	42′6″	Sulzer	10-cyl.	2	15,500	Nippon Yusen K.
TATSUTA MARU*	16,500	560′0″	72′0″	42′6″	Sulzer	10-cyl.	2	15,500	Nippon Yusen K.
CHICIBA MARU*	16,500	560′0″	72′0″	42′6″	B. & W. d-a	8-cyl.	2	15,500	Nippon Yusen K.

*Liners under construction. †Proposed American motorliners.

suredly will be Diesel-driven throughout.

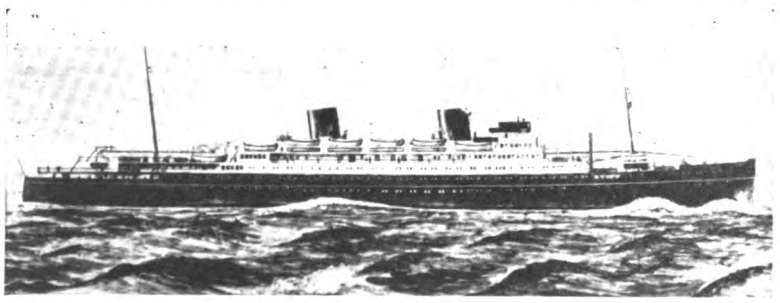
Face the warning boldly and take heed of it, look at the facts squarely and admit that the motorliner already has won through to over 30,000 tons gross and near 30,000 horsepower. Do not flinch from accepting the evidence that the British, French and Japanese are now joining the Swedish and the Italians in ordering motorliners of very nearly that size for the transatlantic passenger traffic. There is no comfort for anyone, either here or abroad, in picking on the motorliners and whispering or gossiping about troubles with their machinery, or quoting vibration that is nonexistent. Whatever troubles they may have had and whatever troubles they may be having are not important enough to rob them of their superior advantages, it is evident from the repeat orders.

The engines of the biggest motorliner AUGUSTUS are being duplicated in the new French motorliner—but two, not four—, and you do not know Frenchmen if you would contend that a French shipping company would forego the prudence of checking up the performance of the Italian liner's machinery. The South African motorliner CARNARVON CASTLE is being repeated in two of her kind. Two larger versions of the Swedish-American motorliner GRIPSHOLM are in hand, one of them well advanced. The executives of this old line are hard-headed, sea-experienced business men—not fools! Lord Kylsant, from his experience of three motorliners, has ordered one of 26,000 tons gross for the White Star service between New York and Liverpool. If those demonstrations of confidence by the people who have the real experience and the real knowledge of motorliner operation do not dispel the doubts and dispose of the evil rumors there is no appeal to reason.

Not by mere numbers alone is the strength of the revolution to be gauged. The speed at which these numbers have piled up is a better measure of the change that is taking place, and this is but a demonstration in the big liner field of the victorious progress of the motorship in all the wide, important fields stretching around the shipping globe. It is a revolution of great importance. You can join it and go forward with it or you can oppose it and be left, but you cannot halt it nor evade its effects.

When the luxurious motorliners ASTURIAS and ALCANTARA running between England and South America far outshine the best steamers operating between the United States and the Southern continent, they assert a superiority that assists British trade. The palatial mortorliner AUGUSTUS carries to Brazil, Argentine and the contiguous countries a definite impression of a new and rising Italy that can outstride other nations with its products. You cannot block that influence by saying you do not believe in motorliners.

The motorliners bode ill for the GEORGE WASHINGTON, AMERICA and REPUBLIC of the United States Lines: second raters now, they will be third raters then. To spend money for new *steam* machinery for the MOUNT VERNON and MONTICELLO looks wicked when you see it this way. Even the LEVIATHAN, along with the others of the Big Six outside the s.s. ILE DE



The Japanese N. Y. K. Line is placing six big Diesel-driven passenger liners in service on the Pacific

Swedish-America motorliner Gripsholm has a performance record unequalled by any steam liner

World's Largest Passenger Liners Built and Building

Arranged According to Gross Tonnage Register

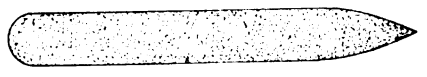
White Star . . . . . 60,000 tons
Leviathan . . . . . 59,957 do
Majestic . . . . . 56,621 do
Berengaria . . . . . 52,226 do
Bremen . . . . . 48,000 do
Europa . . . . . 48,000 do
Olympic . . . . . 46,439 do
Aquitania . . . . . 45,647 do
Ile de France . . . . . 43,548 do

Paris . . . . . 34,569 tons
Homeric . . . . . 34,351 do

AUGUSTUS . . . . M. V. . . 32,650 tons
Roma . . . . . 32,583 do
Columbus . . . . . 32,354 do

Mauretania . . . . . 30,696 tons
Statendam . . . . . 28,150 do
Cap Arcona . . . . . 27,561 do

~~Belgenland~~ COLUMBIA . . . . . 27,132 tons



BRITANNIC . . . . M. V. . . 26,000 tons

Adriatic . . . . . 24,563 tons
Conte Grande . . . . . 25,661 do

Empress of Scotland . . 25,160 tons
Conte Biancamano . . . 24,416 do
Diulio . . . . . 24,281 do

Rotterdam . . . . . 24,149 tons

VULCANIA . . . . M. V. . . 24,000 tons

SATURNIA . . . . M. V. . . 23,940 tons
Baltic . . . . . 23,884 do

George Washington . . . 23,788 tons

France . . . . . 23,769 tons

ALCANTARA . . . . M. V. . . 22,181 tons

ASTURIAS . . . . . M. V. . . 22,071 tons
FRENCH LINER . . M. V. . . 22,000 do
Minnetonka . . . . . 21,998 do
Minnewaska . . . . . 21,716 do
Empress of Australia . . 21,833 do
Giulio Cesare . . . . . 21,657 do
Empress of Canada . . . 21,517 do
Duchess of Atholl . . . 21,500 do
Duchess of Bedford . . . 21,500 do
Duchess of . . . . . 21,500 do
Duchess of . . . . . 21,500 do
New York . . . . . 21,455 do
America . . . . . 21,329 do
Cedric . . . . . 21,227 do
Celtic . . . . . 21,179 do

Hamburg . . . . . 21,133 tons
Maloja . . . . . 20,837 do
Albert Ballin . . . . . 20,815 do
Deutschland . . . . . 20,607 do
Cap Polonio . . . . . 20,517 do

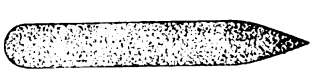
California . . . . . 20,325 tons
Virginia . . . . . 20,300 do
Third P. P. liner . . . 20,300 do
Carinthia . . . . . 20,277 do
Franconia . . . . . 20,175 do

CARNARVON CASTLE . . M. V. . . 20,063 tons
. . . . . *CASTLE* . . M. V. . . 20,050 do
. . . . . *CASTLE* . . M. V. . . 20,050 do
Otranto . . . . . 20,032 tons
Oronsay . . . . . 20,001 do
Orford . . . . . 19,941 do

Reliance . . . . . 19,802 tons
Resolute . . . . . 19,802 do
Caronia . . . . . 19,782 do
Orama . . . . . 19,777 do
Laconia . . . . . 19,695 do
Samaria . . . . . 19,597 do

Carmania . . . . . 19,566 tons

MONTICELLO . . . . . 19,361 tons
Taj Mahal . . . . . 19,300 do
Arundel Castle . . . . 19,086 do

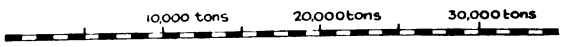


BERMUDA . . . . . M. V. . . 19,086 tons
KUNGSHOLM . . . . M. V. . . 19,000 do
. . . . *HOLM* . . . . M. V. . . 19,000 do
JOHAN VAN OLDEN BARENVELT . M. V. . . 19,000 do
MARNIX VAN ST. ALDEGONDE . . M. V. . . 19,000 do
Windsor Castle . . . . 18,697 do
Conte Verde . . . . . 18,765 do
Laurentic . . . . . 18,724 do
Lapland . . . . . 18,565 do
Ceramic . . . . . 18,495 do

MOUNT VERNON . . . . 18,372 tons
Empress of France . . . 18,357 do
DEMPO . . . . . M. V. . . 18,000 do
BALOERAN . . . . . M. V. . . 18,000 do
Republic . . . . . 17,910 do
De Grasse . . . . . 17,759 do

GRIPSHOLM . . . . M. V. . . 17,716 tons
AORANGI . . . . . M. V. . . 17,491 do
Minnekahda . . . . . 17,281 do

Malolo . . . . . 17,232 tons



Profile Plan. *Light grey*, Motor liners; *Dark grey*, Steam liners. Type. *Italics*, building; *Roman*, operating. American vessels indicated by flag.

The above comparisons strikingly depict the important position held by Diesel-driven vessels among the World's finest trans-ocean liners.

FRANCE, will be unable to conceal her age—she and they are getting old. The motorliners will make them look gray.

Until now the motorliners GRIPSHOLM and SATURNIA have been lone stars in the North Atlantic trade. New stars are soon to rise and will make a glitter. GRIPSHOLM will have a partner, KUNGSHOLM. AUGUSTUS, SATURNIA and VULCANIA are to be operated in the North Atlantic at the turn of the year. Two new cabin motorliners, MILWAUKEE and ST. LOUIS, under the Hamburg-American Line's house flag, though not so pretentious, will add their weight early next year. The big Diesel liner BERMUDA has been such a success that she is to stay the year round in American waters. The list of motorliners grows fast. Where do you see big, new steamers coming? That is what one must note. And on the Pacific the Nippon Yusen Kaisha will run 19-knot motorliners between San Francisco and Japan and slightly smaller 18-knot motorliners between Seattle and the Orient, outdistancing all steamers and setting a new standard of travel comfort that only newer motorliners will be able to match or excel. No wonder Robert Dollar now is giving thought to Diesel power for his new world-run liners.

This is no freak revolution. Live shipowners are not building motorliners as an indoor sport. They are building them to make money. They figure and figure and figure again, closely, accurately, not in any sums like movie magnates or cloak and suit men, but with fine calculations under every head, totalled up, scrutinized, checked and proved. They have no foregone conclusions: they do not cheat themselves. Higher first cost does not check them. Once they have stepped forward you have not seen them go back. Some have taken longer than others to work out the figures that have convinced them on the motorships, and the early ones have had to weigh the engineering hazards. But, where is a single one who has failed to proclaim that in going over to the motorship he took the right step? The men who know are the men who have tried and now have their proof. *Are their words and their actions not sounder and more reliable than the croakings of the critics who have no experience?* You can give but one answer.

When a man like Lord Kylsant can stand up and say, as he did recently to the American Chamber of Commerce in London, "The companies under my control now have 90 motorvessels in commission or building, of over 560,000 gross tons register," is it not evidence that there is a man who has learned motorship economics? Think of that motorship fleet! It is about half the entire *operating* fleet of the U. S. Shipping Board. Kylsant is operating three motorliners, each exceeding 20,000 tons gross, and has had them in operation long enough to know how they are doing. Three more has he ordered, including one of 26,000 tons gross for the White Star Line in the North Atlantic trade, which it has been customary to regard hitherto as a steamer preserve.

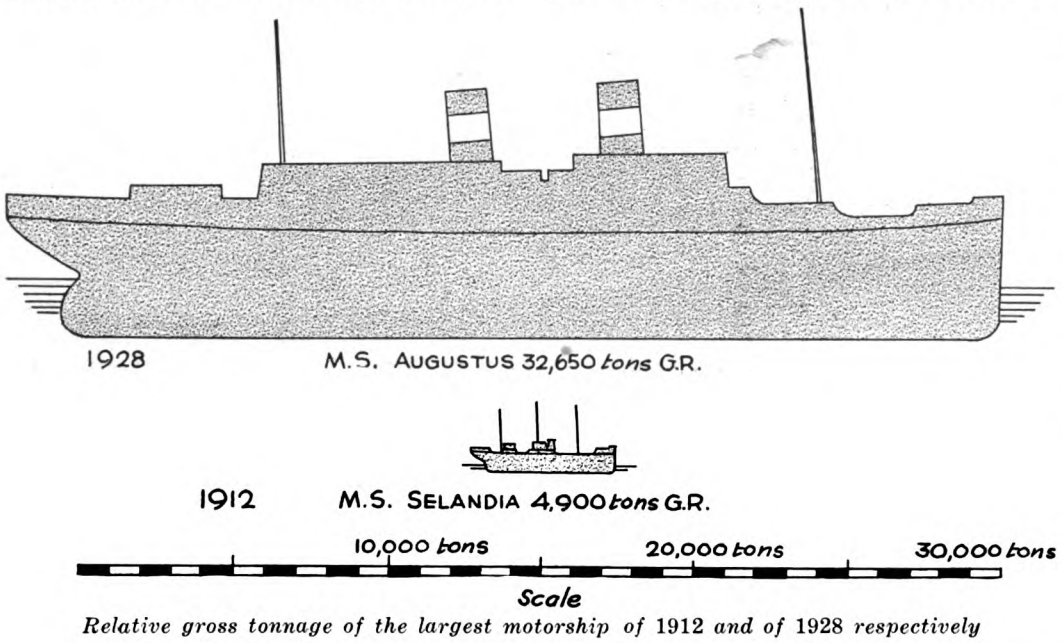
It is not within reason to argue that his figures may be wrong. He has at his disposal all the White Star history in its complete form, the operating data being in the shipping company's office and the construction experience in the Harland & Wolff yard, of which also he is the head, the yard where all the White Star boats, with one exception, have been built since 1870. He knows what the turbine-driven MAJESTIC costs to operate and what her earnings are. He has all the costs on the s.s. OLYMPIC, which with main reciprocating engines and exhaust turbines is generally understood to have achieved an economy of operation and maintenance that the turbine boats have been unable to equal. Through his Harland & Wolff yard he has the benefit of that firm's experience in the construction of a greater tonnage of motorships and a larger total of marine Diesel power than built by any other owner.

He has lifted himself from the crowded floor of the business world to the headship of the greatest aggregation of shipping interests in the world. His accomplishments have extended beyond ship operation and ship construction, to ports, terminals, railroads and trading companies. Everything he has touched he has improved. Always he has built up, always he has been creating where nothing was before. That is the man who figures on Diesel machinery of 100,000 horsepower, and now you will understand why. He may judge the advance from 30,000 hp. to 100,000 hp. too great to be made in one step at this time by his engineers. But, on the other hand he may not. He is measuring it, as he must have measured every other accomplishment of his career, with an infinite capacity for taking pains, and that, as Napoleon said, is genuis.

You and I may be appalled at the mere thought of a man accepting such responsibility. His courage is magnificent. It should be an inspiration to American shipowners, shipping advisers, shipping officials and all those having to do with ships. The only way to keep up with the procession is to emulate the painstaking methods, deep thought, dauntless will, bold courage and burning ardor of such a leader of shipping. Where is such a man among our own shipowners?

Big, powerful motorliners operating under the British, Italian and Swedish flags, with more big motorliners in the offing to fly the Dutch, German, Japanese and French flags stare us in the face mockingly, while MOTORSHIP'S plan to rebuild our MOUNT VERNON and MONTICELLO as Dieseliners and as the finest, fastest cabin boats in the world is opposed under the various pretexts that it is a step into the dark and the unknown, an unjustified investiment or an interference with national economy.

These baneful influences have conspired once before to undo a constructive effort to put the United States in the motorliner list. Four years ago Admiral Benson at the Shipping Board also visioned the coming change and took steps to ride the wave. With as shrewd a foresight and as daring a courage as mark the shipping leaders of other nations, he ordered designs prepared for two United States motorliners of s.s. GEORGE WASHINGTON size, convertible into airplane carriers and sought an appropriation from Congress to build them. The proposal was killed but you can see today how clear was Benson's vision. Congress has voted sufficient money to rebuild the MOUNT VERNON and MONTICELLO as motorliners. Who takes the responsibility of obstructing this progressive step?



Relative gross tonnage of the largest motorship of 1912 *and of* 1928 *respectively*

Henry Ford Sets Another Precedent

Converts the Shipping Board Steamer LAKE ORMOC Into the Finest Small Cargo Motorship Afloat

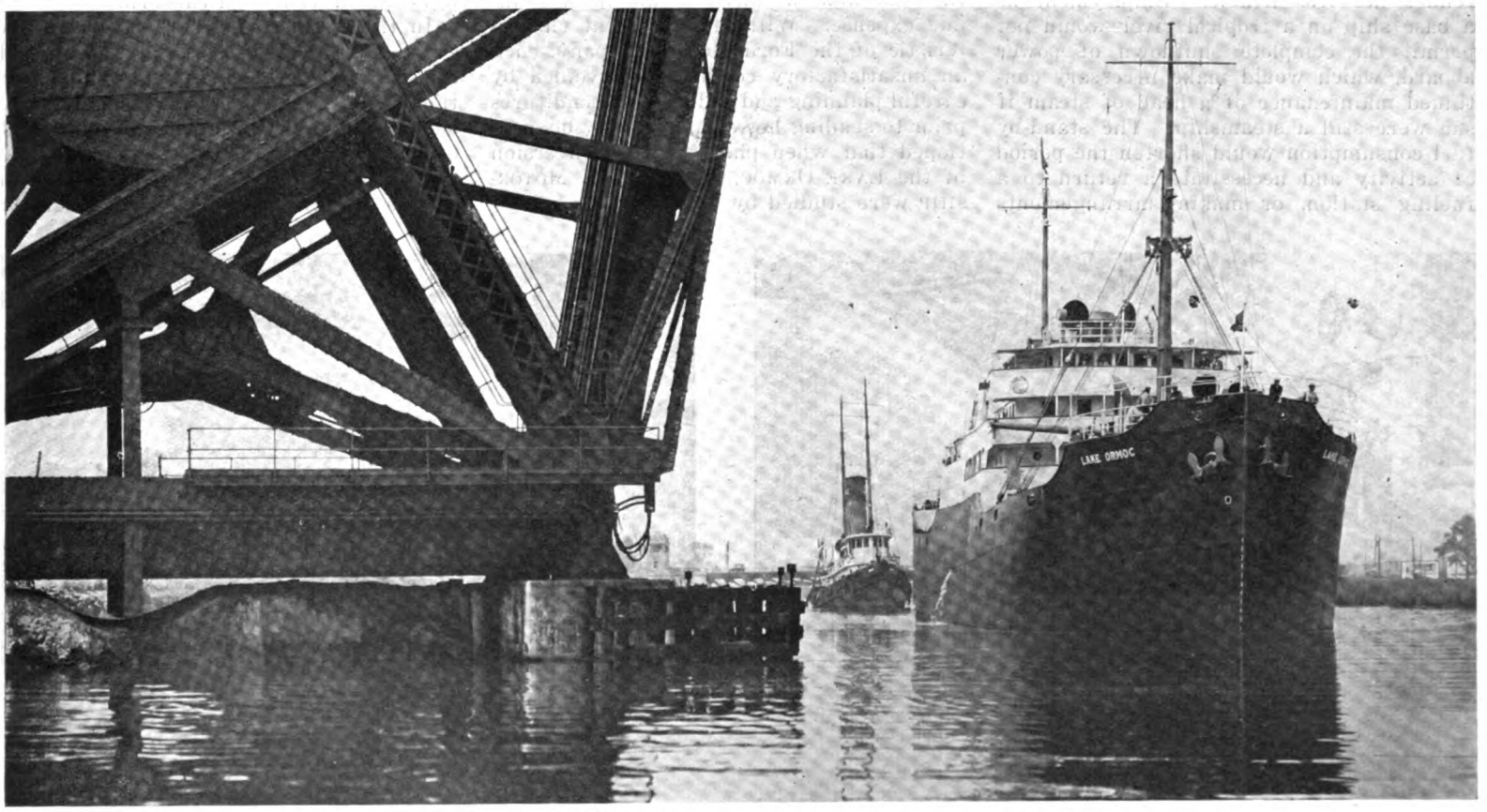
TO the average shipping man the term "Ford product" visualizes engineering production in quantity, in the shortest time, at the lowest possible cost. But it takes a visit to one of the great Ford plants to realize that in manufacturing a low priced automobile, Henry Ford spares no expense or engineering skill for whatever is necessary to attain the desired aim. This policy holds good whether it be steel mills, blast furnaces, drop forges, glass factories, power plants, railroads, aeroplane shops, docks or ships. Everywhere that Ford's hand reaches one finds a degree of engineering and finish and careful attention to little details that are way ahead of most other great manufacturing concerns. How many know that for Ford car manufacture Johansson master-gauge blocks accurate to one-millionth of an inch are used? To the layman even this must give some conception of Ford standards of precision.

No wonder that Ford insists on something better than regular marine standards for his ships. Today his motorship EAST INDIAN of over two years' service remains the finest cargo-carrying vessel on the High Seas, although but a converted Shipping Board war-time steamer orginally built in the Orient. To describe her accurately, MOTORSHIP in March, 1926, gave the most complete and carefully prepared description ever published on any ship in any marine journal. Ford's specially-built Die-

Ford knows value of advertising

sel freighters BENSON FORD and HENRY FORD II are still unequalled on the Great Lakes. If it is realized that when his plants are in full swing over $150,000,000 is paid annually in transportation charges, it is not hard to understand why Ford turns to economical Diesel power. And, why his ships are exceptionally well equipped with every modern device proven practical for efficiency and comfort in marine service, plus other mechanisms specially developed at Dearborn for a particular ship and her work.

On the new vessel we are about to discuss —we use the term "new" advisedly, as she has been made equal to new—special service and trade has had the closest study. For instance, the living quarters and engineroom are cooled by refrigerated air, regulated to the taste of the individual, as she will operate at the Equator. Appreciation thus has been given to the fact that the best service can be gotten out of a crew that is contented and comfortable. Roomy cabins with home-type beds, circulating ice water for drinking and bubble fountains, hot and cold running water, for washing and bathing, tiled bathrooms with tub and shower, and with three large screened windows—not ports—are provided for employees of the company who may have to travel in connection with Ford's new Brazilian rubber plantation operations. One also finds aboard, a completely equipped hospital with operating room, and a laboratory with medicines and cultures to combat tropical maladies and diseases. Another thought; although a regulation R.C.A. radio transmitter has been installed, there also is to be found in the wireless room on board a short wave transmitter. Not just bought in the market, but designed and built by Ford radio engineers at Dearborn.



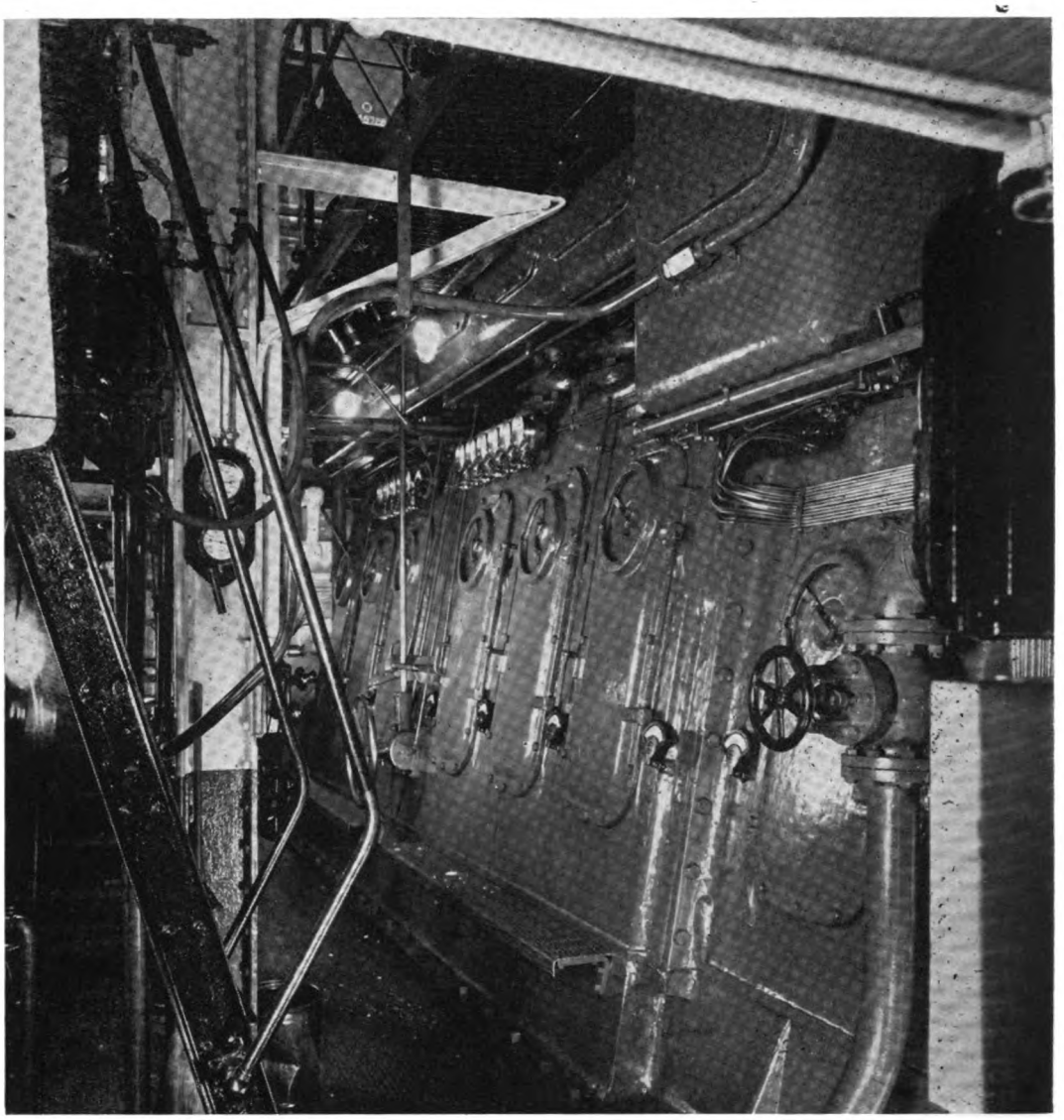
Lake Ormoc leaves the Ford plant at Detroit on her important mission to the heart of Brazil

It enables the Captain to keep in frequent and direct touch with headquarters. This in addition to a Ford-built broadcast receiving set in the combined passenger and officers' lounge for entertainment.

Again, in the galley electric-cooking, electric hot water heaters, electric coffee urns, electric meat choppers, electric bread mixers and G. E. electric-refrigerating add to the comfort and convenience of the cook's staff when in the tropics. Gas masks are even provided for the engineroom crew in case of ammonia leaking from the ice plants. These and many other details show that the Ford marine department has approached ship construction and operation in an entirely new direction from the old school shipowner harnessed to precedent. Yet it must not be forgotten that the entire conversion and reconditioning were carried out—not in a shipyard, but at the Ford automobile plant at Dearborn, Michigan. The EAST INDIAN, however, was a Sun shipyard conversion.

In this introduction we are referring to the motorship LAKE ORMOC, which has just completed conversion from a 3500-ton Shipping Board steamer. She called at New York last month en route from Detroit to the Amazon river, where she will be stationed—first as a depot ship, later, when the new plantation has sufficiently developed, on a 700 mile run each way on the Amazon and Tapajos rivers with rubber, cargo, etc. As she stands today she probably is the most complete motorship of her tonnage afloat. Certainly she is one of the most interesting even if just a small craft.

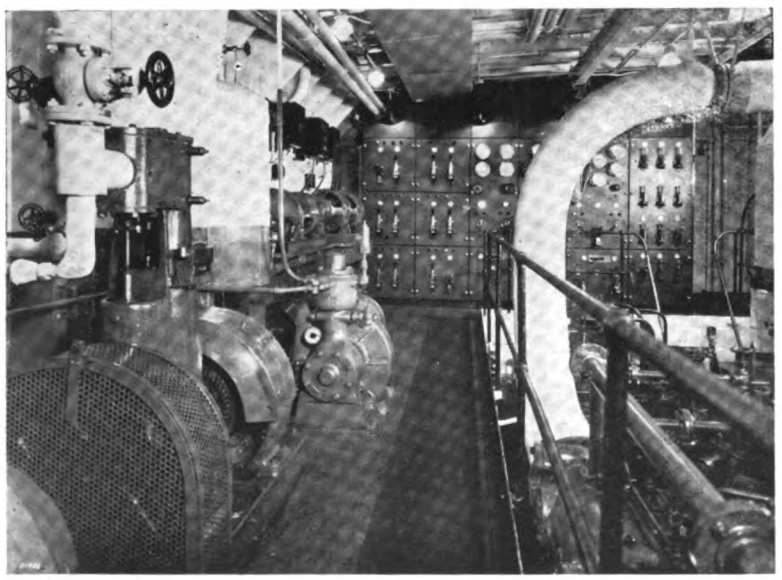
There is little to remind one of the former steam-powered lake-built ship. Aside from the natural economies resulting from Diesel power, the LAKE ORMOC now lends herself to tropical development work in a manner which no steam vessel could equal. Climatic conditions are such that the addition of heat from boilers would render her less livable. Employment as a base ship on a tropical river would not permit the complete shutdown of power aboard, which would make necessary continued maintenance of a head of steam if she were still a steamship. The stand-by fuel consumption would shorten the period of activity and necessitate a return to a fueling station, or making arrangements for transportation of fuel to her base. The former plan would interrupt activity at the base and the latter would involve undue expense. With the foresight characteristic of the Ford Motor Company, such an unsatisfactory condition is avoided by careful planning and judicious expenditures prior to sending her away. It may be mentioned that when planning the conversion of the LAKE ORMOC, the pages of MOTORSHIP were studied by Ford officials.



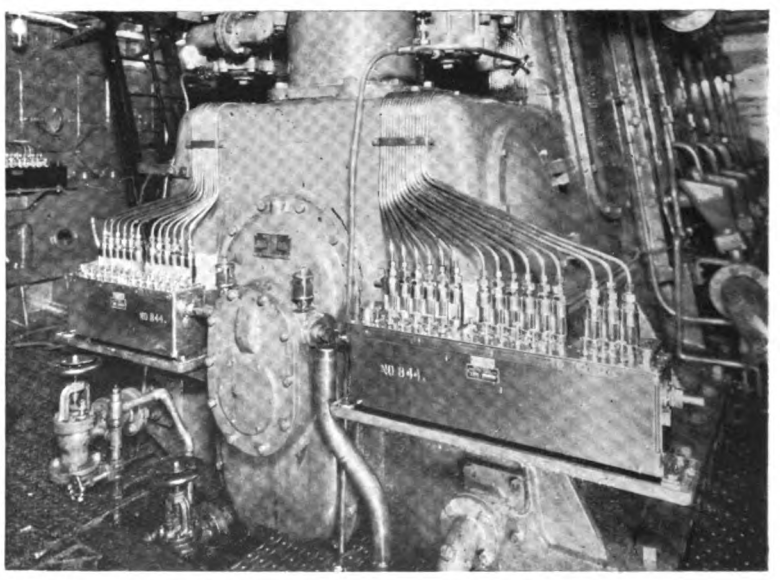
Lower engineroom floor showing the 1000 *s.hp. Diesel main engine*

In our June issue we exclusively published plans of the "new" LAKE ORMOC, following a visit to Dearborn.

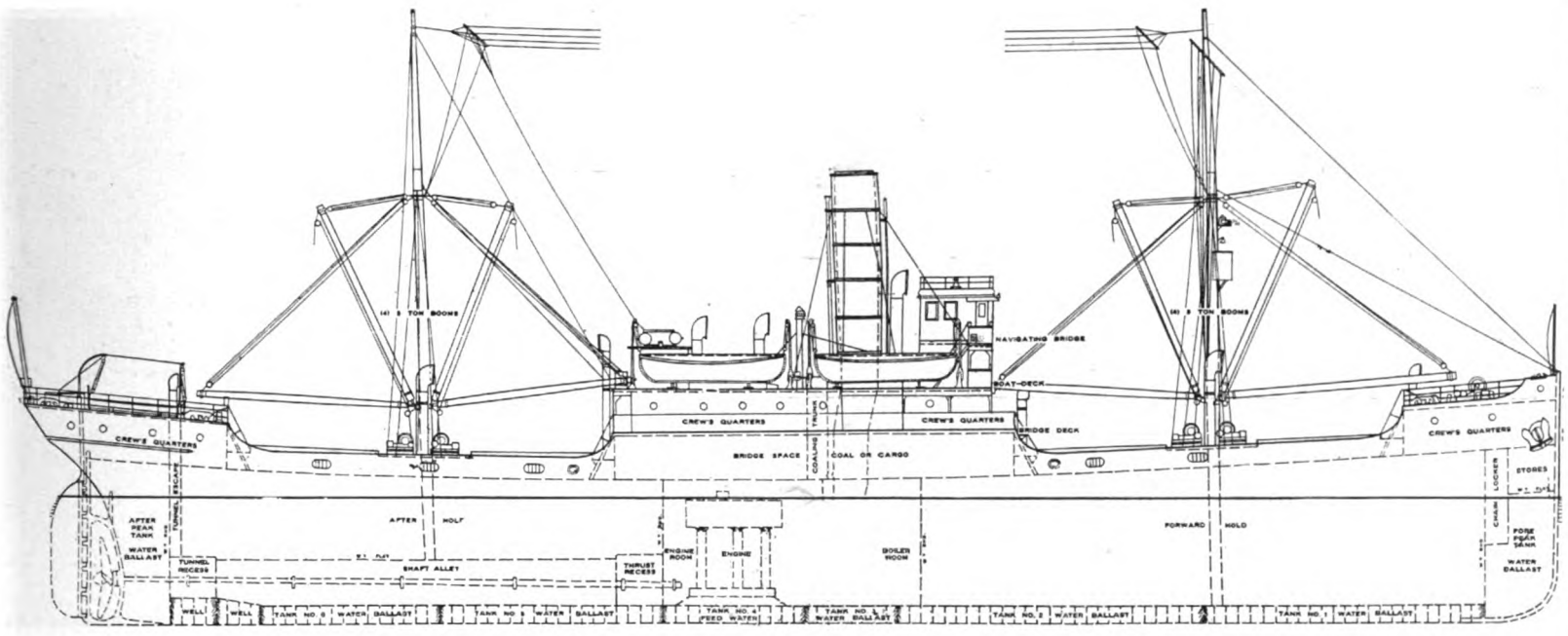
In the engineroom there is evidence on every hand of careful study based upon the company's experience in motorship operation. All of the auxiliary machinery including the deck auxiliaries are electrically operated. Power for this is generated with two Worthington Diesels direct-connected to two 120 kw. 250 volt G. E. generators.



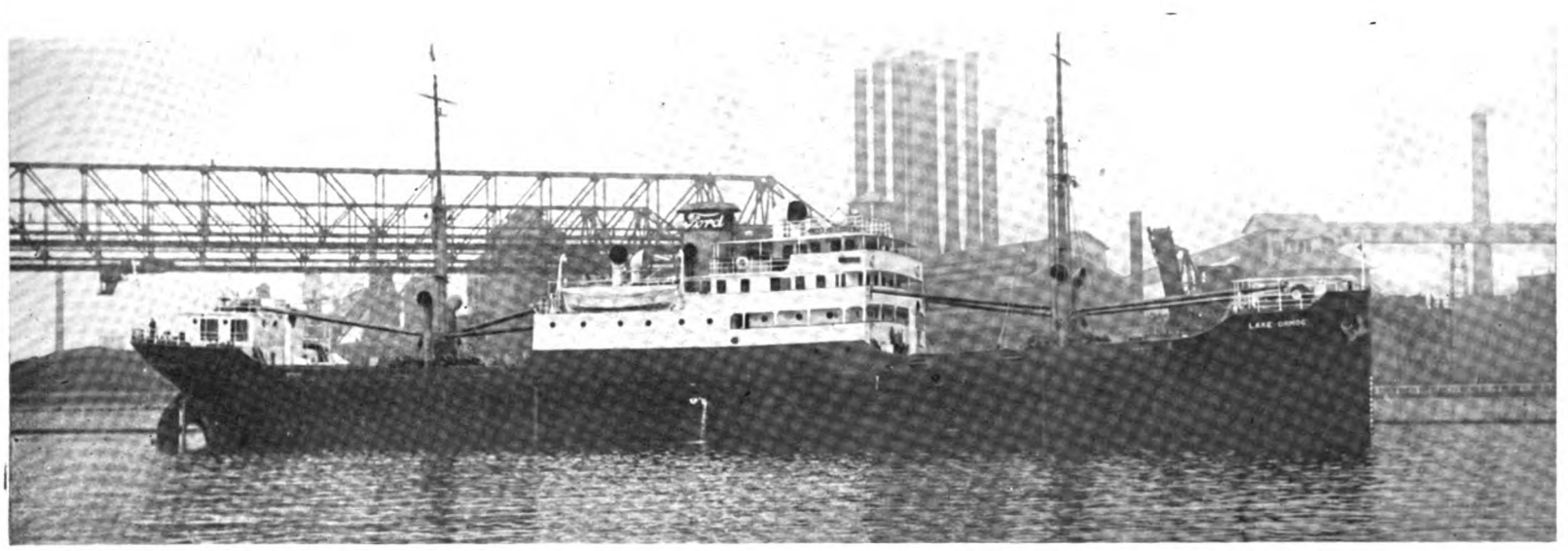
Neat, orderly arrangement of the engine-room is seen from this illustration of the machinery flat



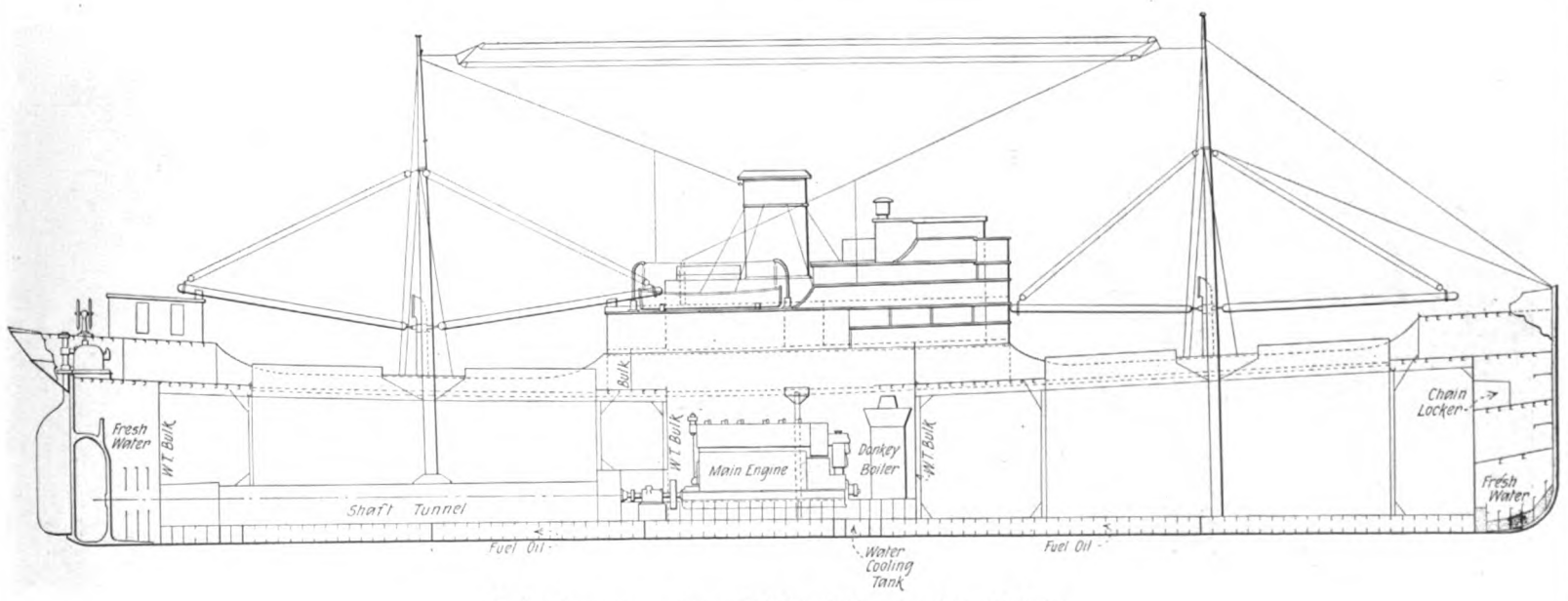
Timed lubrication of the main engine cylinders is accomplished with mechanical lubricators



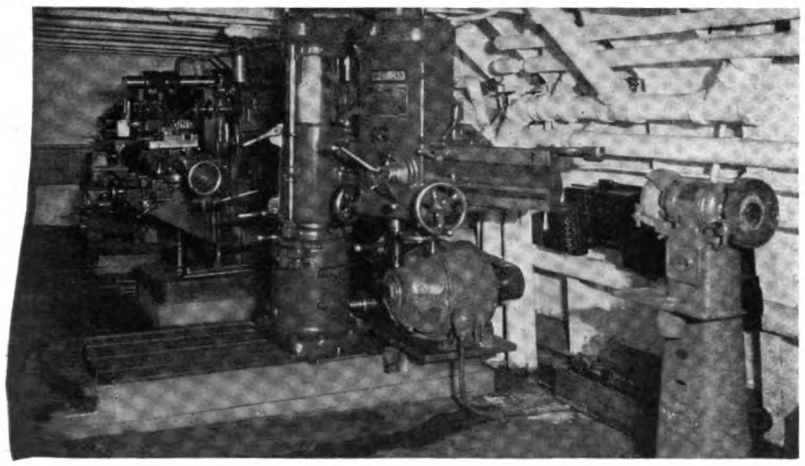
Lake Ormoc prior to her conversion by Ford Motor Company to Diesel power



Lake Ormoc after conversion. Fordson power house No. 1 and ore bridge are in the background



Lake Ormoc as converted to 1000 s.hp. Diesel drive



Lake Ormoc machine shop is exceptionally well equipped

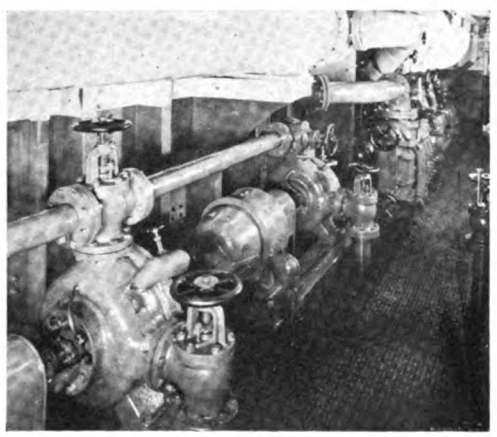
Refrigerated air cooled stateroom with private tub-shower bathroom

Auxiliary machinery and galley equipment circuits are 250 volt, while the lighting system and steering gear is 125 volts. Reduction in voltage is accomplished by means of balancer sets, one of which carries the lights and the other the steering gear. One balancer set on each circuit is equal to normal load. The others are stand-by units.

The switchboard, of dead-front type and of Ford assembly, is located on the machinery flat aft. Weston recording voltmeter and ammeter are used in addition to the conventional instruments, thus giving a continuous record of the power output of the generators. All I.T.E. circuit breakers are located back of the panel giving a clean cut appearance to the front. Main leads, in armored cable, are carried to the deck machinery distribution panels located in two compartments, one forward and one aft of the engineroom casing on the main deck. There are five control panels of Westinghouse make in each of these rooms. The forward set controls the four electric deck winches on the fore deck and the original windlass, formerly steam driven which has been converted to electric drive with a 25 hp. Westinghouse motor and Benson Electric gears. It is also arranged for use as a mooring machine. The after group of panels control the after deck winches and mooring machine mounted on the poop.

The main engine, a six-cylinder, 17 in. by 27 in., two-cycle Busch Sulzer Diesel of 1,000 s.hp. at 165 r.p.m. was described in our July issue. It drives the LAKE ORMOC at 9½ knots.

It is cooled with a fresh water closed system. Water for this is carried in double-bottom tank under the engineroom, and a G.R. heat exchanger is used to cool it. The auxiliary engines may be cooled with



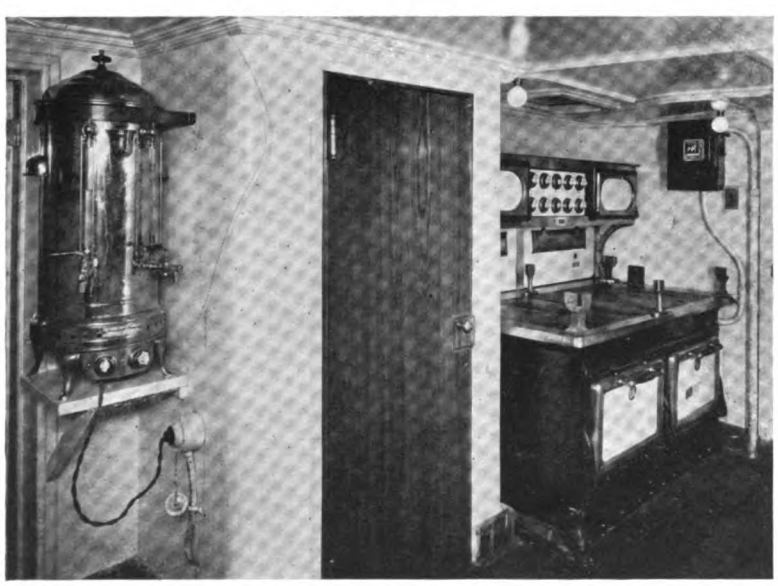
Some of the roturbo pumps in the engineroom

water from the sea, or by the fresh water system, but the main engine circulation cannot be taken direct from the sea. There can be no stoppage of the strainers resulting from accumulations of vegetable matter and mud frequently encountered in tropical rivers. Further, it is impossible to pump bilge water through the cylinder jackets, a precaution well taken since serious trouble has resulted from grease laden jackets and mud deposits combined. Thus, there is one hundred percent protection against fouled main engine water jackets resulting from operation in contaminated waters. To facilitate starting the main engine in cold weather, arrangement is made to circulate warm water from the auxiliary engines through the jackets of the main engine.

Eight Manistee rototurbo pumps with Reliance motor drive are used for various water services, excepting bilge pumping. The latter is taken care of with an 850 g.p.m. 8 in. x 10 in. Worthington duplex pump driven by a 50 hp. Reliance motor, by means of a Link Belt silent-chain drive.

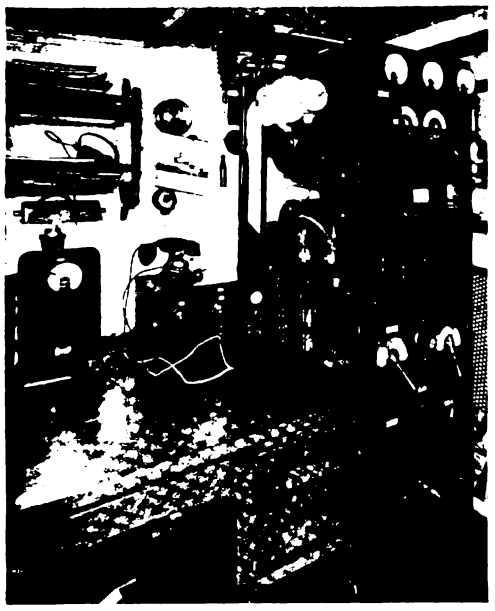
A De Laval gas-tight fuel-oil centrifuge is installed in a separate compartment on the main deck forward of the engineroom casing. The lubricating-oil centrifuge, of similar make, is located on the engineroom lower deck. The piping and pumping arrangement is such that oil in the main or auxiliary engines may be processed continuously or in batch lots. The engine systems are separate, making it impossible to mix the oil of one engine with that of another. Oil cooling is accomplished with a G.R. heat exchanger.

A Connoly vertical fire-tube oil-fired boiler is used to heat the ship in cold climates, to operate an evaporator and one or both Engberg 10 kw. generating sets. The lagging on this boiler is neatly done in plan-

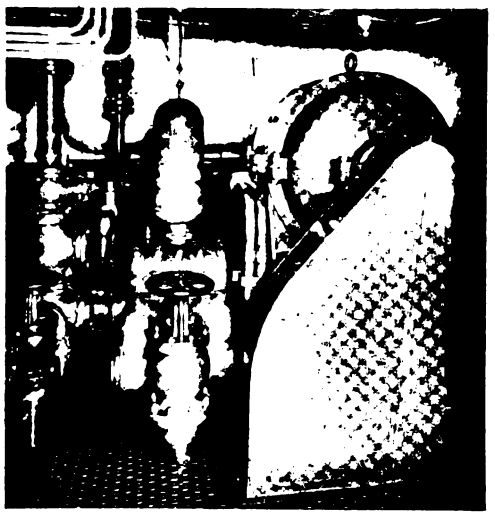


The modern galley is completely electrically equipped

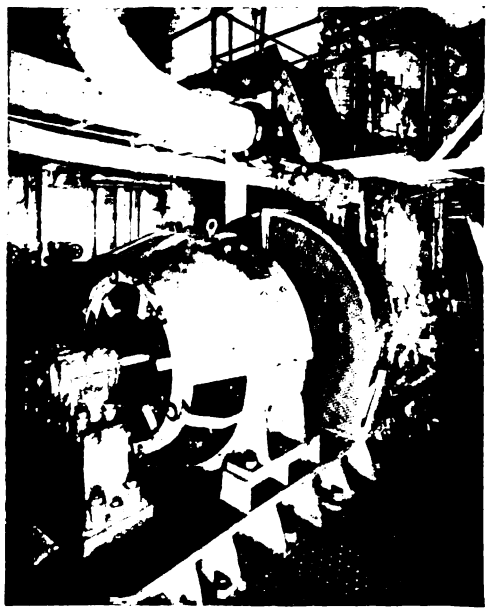
Pilot house of the Lake Ormoc is modern in every respect



The wireless set is a 750 watt installation



Duplex bilge and general service pump has chain drive



One of the auxiliary Diesels and generators

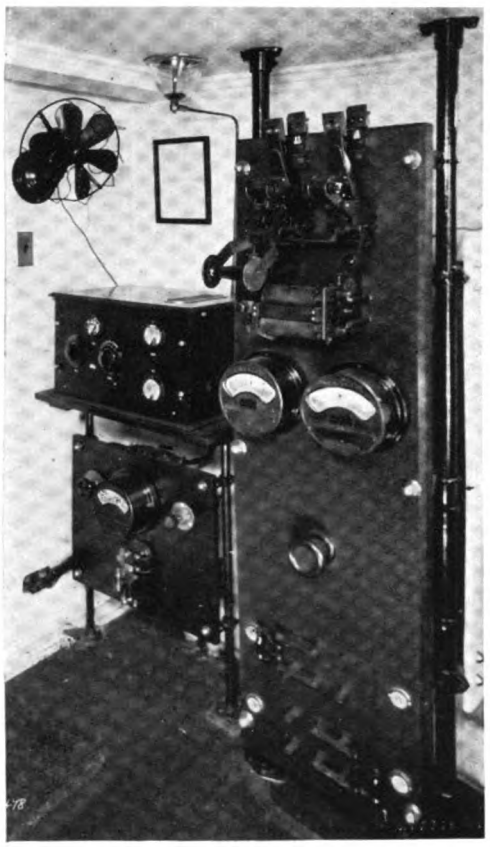
EQUIPMENT OF THE LAKE ORMOC

Name of Unit	No. of Units	Make	Power or Capacity
Propelling Machinery			
Main engine	1	Busch Sulzer	1000 s.hp.
Auxiliary Power Equipment			
Generator engines	2	Worthington	180 hp.
Steam generator sets	2	Engberg	10 kw.
Auxiliary compressor	1	Busch Sulzer	.....
Emergency compressor	1	York	.....
Pump Equipment			
Aux. circulating pump	1	Manistee†–Reliance*	500 g.p.m.
Jacket water circulating pump	2	Manistee–Reliance	350 g.p.m.
Fire and general service pump	1	Manistee–Reliance	360 g.p.m.
Raw water pump	1	Manistee–Reliance	360 g.p.m.
Sanitary pump	1	Manistee–Reliance	100 g.p.m.
Bilge and ballast pump	1	Worthington–Reliance	450 g.p.m.
Fuel oil transfer pump	1	Worthington–Reliance	60 g.p.m.
Main eng. lub. oil pump	1	Schutte & Koerting	.....
Aux. eng. lub. oil pump	1	Schutte & Koerting	.....
Fresh water pump	2	Manistee–Reliance	50 g.p.m.
Fuel oil transfer pump	1	Worthington–Reliance	.....
E. R. Bilge Pump (steam)	1	Worthington	.....
Lubrication and Fuel			
Mechanical lubricators	4	McCord and Manzel	.....
Fuel oil centrifuge	1	De Laval	No. 600
Lubrication oil centrifuge	1	De Laval	No. 360
Refrigeration			
Ammonia compressors	3	York–Reliance	1 ton
Electrical Equipment			
Main generators	2	General Electric	120 kw. 250 volt
Balancer sets	2	Westinghouse	5 kw.
Balancer sets	2	Reliance	5 kw.
Switchboard	1	Ford	.....
Starting panels	..	Westinghouse	.....
Magnetic clutches	..	Cutler–Hammer	.....
Pump motors	..	Reliance	.....
Deck machinery motors	10	Westinghouse	.....
Steering gear motors	2	Reliance	.....
Lighting panels	..	Benjamin Starret	.....
Electric water heaters	..	Wiessel	.....
Volt and watt meters	..	Saugamo	.....
Voltmeters and ammeters	..	Weston Electric	.....
Recording volt and watt meters	..	Esterline Angus	.....
Circuit breakers	..	I. T. E.	.....
Switches	..	Bulldog	.....
Pilot House Equipment			
Gyro and repeaters	6	Sperry	.....
Steering equipment	..	Benson Electric	.....
Radio direction finder	1	R. C. A.	.....
Automatic sounding machine	1	Benson Electric	.....
Air whistle	1	Tyfon	.....
Automatic whistle and flashlight	1	Benson Electric	.....
Searchlight	1	Sperry	.....
Course recorder	1	Sperry	.....
Compass binnacles	2	Keuffel & Esser	.....
Telegraph	3	Chadburn–McNab	.....
Helm-angle indicator	1	Benson Electric	.....
Deck Machinery			
Winches	8	Lidgerwood-Westinghouse	.....
Anchor windlass‡	1%	Am. Clay–Westinghouse	.....
Warping winch	1%	Benson Electric	.....
Radio and Telephone			
Transmitter	1	R. C. A.	750 watt.
Transmitter (short wave)	1	Ford	750 watt.
Telephones	10	P. A. X.	.....
Telephone automatic exchange	..	Stowger Automatic	.....
Broadcast receiver	1	Ford	.....
Miscellaneous			
Galley range and electrical cooking devices	..	Standard Electric Stove	.....
Washing machine	..	Easy Washer	.....
Engine exhaust silencers	3	Maxim	.....
Fuel oil meters	..	Bowser	.....
Forced ventilation	..	Clarage	.....
Heat exchangers	2	Griscom Russell	.....
Storage batteries	..	Edison	150 amp. hr.
Oil coolers	..	Griscom Russell	.....
Engine room ventilating blower	..	American Blower	.....
Temperature indicators	10	Motometer	.....

* Motors. † Pump. ‡ Converted by Benson Electric Co.

ished iron and nickle plated steel binders.

Three York 1-ton ice machines salvaged from the scrap ships, and converted from steam to electric drive at the Fordson plant, are located in a separate compartment on the machinery flat. One such machine is giving satisfactory service as an emergency air compressor. The refrigerating machines maintain the correct temperature in a chill-room and sharp freezer with capacity of 2500 cu. ft. Scuttle-butt and ice making tank are located in the ice machine room. The circulating ice water system connects with the scuttle-butt.



This short wave wireless transmitter is a Ford product, as is the broadcast receiving-set

Standardization and interchangeability of parts is applied in an unusual manner. The main generators, armatures and field coils are interchangeable with the auxiliary air compressor drive motor. The valves and cooling coils of the auxiliary compressor, which is made by Busch Sulzer, are interchangeable with the attached compressor on the main engine, even though these machines are not of similar size and capacity. In fact, standardization has been carried out wherever practicable.

Worthy of second notice is the machine shop. The machines include a 16 in. American lathe, 3 ft. radial drill press, No. 2-A Brown & Sharp milling machine, 16 in. Cincinnati shaper, 13 in. Universal tool grinding machine, a power hacksaw, and an electrical tool grinder. Every conceivable tool is carried in one of three well-equipped engineer's store rooms.

The eight deck winches are electric, and are operated by Westinghouse motors of 25 hp. each. These serve four holds and are rigged to the conventional type of boom for cargo handling. At No. 1 hold a 60-ton Jumbo boom is rigged to the fore mast. Additional purchase for heavy weight lifts and topping lift is taken care of by multiple sheave arrangement of tackles.

A new type Benson steering gear is located aft. Two 35 hp. Reliance motors, one a stand-by, may be engaged by means of Cutler Hammer magnetic clutches. Reduction gears, located on either side of the steering machine idle on the end that is not driving. Starboard gears are arranged to connect with hand steering located on the poop deck. Power steering is controlled electrically from the pilot house by means of a Benson electric steeromotor.

The steering gear is of very sturdy construction. A steel crosshead slides on, and is supported by a substantial steel guide bar, and is moved from side to side by a large quadruple thread screw shaft. This shaft is operated by one of the 45 H.P. Westinghouse motors through helical cut steel gears. The screw shaft carries no load and is not subject to any bending moment, being merely subjected to tension and compression. Alternate pressure on opposite sides of the thread, materially aids lubrication supplied in the form of a bath of oil.

The connection to the rudder stock from the crosshead is accomplished by means of two forged steel tiller arms. These in turn travel in and out through bronze bearings in a forged steel cross link, which turns with them in a bronze bearing in the cross head.

A floating bearing or crosshead is clamped in a central position in the main crosshead by eight large springs (sixteen in all) on either side. These springs absorb the torque during the hard-over position of the rudder. They also protect the rudder should it strike a floating obstruction or come in contact with the bottom in shallow water. Stops are arranged so as to eliminate any possibility of crushing the springs.

An electric follow-up controlled from the pilot house by means of the steeromotor is enclosed in a cast iron housing, and is immersed in oil; thus wear is reduced to a minimum at the contact points, and arc or burning of them is eliminated. Instant change over from one motor to another is accomplished from the pilot house without stopping the ship, and at any rudder position. This makes the standby motor effective in an emergency. The mechanism is very quiet in operation.

In the pilot house Sperry navigating instruments include a master gyro, four repeaters and a course recorder. There is an R.C.A. direction finder and McNab revolution indicator. Depth of water is constantly indicated with an automatic rounding machine also located in the pilot house. A Benson flashlight-type electric whistle device operates on either the Tyfoon air whistle and the steam whistle, and may be set to the number and order of blasts desired by the navigator.

A Sperry searchlight mounted on top of the pilot house is controlled from within. In the pilot house a standard compass, binocles and ship's telegraph are also to be found.

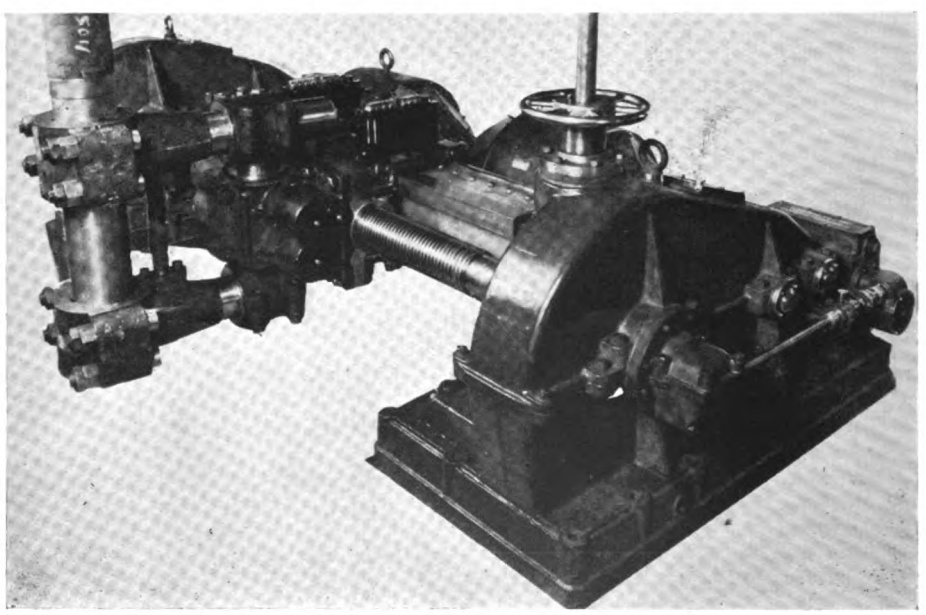
To prevent interruption of electric current for the Gyro, and to supply current for emergency lighting, a 150 amp. hour Edison storage battery is provided. There are separate storage batteries for the various radio equipment.

As indicated by the foregoing description, the LAKE ORMOC is a very serviceable, small seagoing freighter of moderate speed. In the event of a change in service requirements, her size permits her to transport cargo to and from the Ford plants via the Welland Canal, the Canadian Locks and the St. Lawrence River. Foreseeing such a necessity the Ford engineers have equipped the LAKE ORMOC to operate in both climatic extremes, affording a maximum of service and comfort the while.

When she left New York she was bound for Para, Brazil, from which point she will proceed to Santarem via the Amazon and Tapajos rivers. Santarem is a port about 100 miles north of the Southern apex of the Ford plantation, a huge tract of land which is estimated to contain between 4,500,000 and 6,000,000 acres extending over a diamond shaped area. This district is one of Brazil's most productive areas.

Dimensions of Lake Ormoc

Cargo capacity (grain)	160,000 cu. ft.
Power	1,000 s.hp.
Propeller speed	165 r.p.m.
Deadweight capacity	3,525 tons
Fuel capacity	500 tons
Speed	9½ knots
Cruising radius	10,000 nau. miles
Daily fuel consumption	4.75 tons
Length	251 ft. 0 in.
Beam	43 ft. 6 in.
Depth	24 ft. 2½ in.



With two motors the electric steering gear has one as a stand-by unit, and instantly available.

Motoring at Sea Without a Duster

Feminine Viewpoint Appreciates Benefits of Diesel Drive; Dubs the Bermuda "Old King Coal Usurper"

By **Blanche Naylor**

The Author

IT is one of the ironical facts of life that drones often are credited with the achievements of toilers. It is an irony of modern shipbuilding that the comforts, conveniences and other advantages of motorship cruising are credited—by many of the passengers at least in their innocent ignorance of modern machinery progress—to improvements in *steamship* design. This was strikingly illustrated on a recent trip I made aboard the Furness motor liner BERMUDA.

"It's a shame that the United States doesn't build steamships like this!"..... ..."Wonderful *steamer*, isn't she!"..... ...Just glides along! These were samples of conversation overheard on the broad, spacious decks of the sootless liner. They were mere *lapsus linguae*, however, compared with the answers of passengers queried about their impressions of their voyage aboard the comparatively new type vessel.

From their answers one gained the impression that nine out of every ten of them were unaware that they were aboard a motorship and that the tenth, who did "know," had only the faintest inkling of what it meant. Yet when it was explained that there was no "black gang" down below sweating under the back-breaking task of stoking endless tons of coal, no soot to spot summery dresses whose owners ventured aft of the two big funnels, and that the saving in space effected by the new motive power was used to give them greater comfort in their cabins and other accommodations,—these "innocents abroad" showed keen interest. Even then their first impulse was to receive the impression of an oil-fired steamer. Oil burning to them meant oil burned under boilers like in their homes.

They just hadn't been told in language of the passenger before. And yet these are the people—the travelling public, who in the last analysis, dictate fashions in ships as well as in clothes and automobiles. To most of them, as to the charming young damsel who, when asked for her opinion on motorships, remarked that she supposed all ships had motors, engines as such are just a means to an end, to be forgotten as much as possible until something breaks down. Passengers, men and women, not especially interested in tons of fuel saved—except if it reduced the cost of passage! Not interested in horse-power developed—except when interpreted in terms of increased speed! Not concerned about economy of space until told that their cabins and wardrobes were bigger, and the lounges, decks and swimming pool more spacious, because economy had been effected below decks in the engine room, water and fuel storage spaces.

These were just average citizens out for a vacation. Possibly not two engineers amongst them; not more than a dozen who could read a blueprint or understand a graph. Their concern wasn't with the r.-p.m. or bore and stroke of the engines. They were interested in COMFORT and CONVENIENCE. If motorships could provide these things better than the old steamships, they were for them. And after living for two days on the luxurious BERMUDA, with its unusually broad sundeck for games, the large dancing deck below, its well designed swiming pool gracing the space which might have been a firemen's messroom, the grand social hall, as spacious as a hotel lounge and more comfortable than a living room at home, cool cabins, even alongside the engine-room trunk all were pretty well convinced that motorships offer superior accommodations.

A few moments rest on deck of the steamer made one resemble the proverbial native of Pittsburgh

Yet these average passengers, quick to appreciate the added comforts of their trip,—the lack of vibration, the cleanliness, the roominess and all the rest,—were unaware that they had Diesel power and not old king coal or oil-fired boilers to thank for their pleasure, until it was explained to them. There was the intelligent-looking man at dinned who replied to his wife's inquiry of the meaning of "M.S." "It used to be His Majesty's Ship, but they've shortened it." A steward courteously enlightened him!

No More Dusters

After dinner, comfortably ensconced in a corner of the great lounge, Staff-Captain Charlton happened in. The conversation turned to motorships. "Our passengers constantly comment 'Why don't American builders produce boats like this?'" the Captain observed. "It is a bit odd, isn't it? In spite of their reputation for progressive industrialism, apparently on the M.S. question shipowners in the States are rather reactionary." The Captain and I strolled away through the library and out to the promenade deck. I was glad to leave some of the assembled group, because not all of the 600 millimeter bores were in the engineroom on that trip.

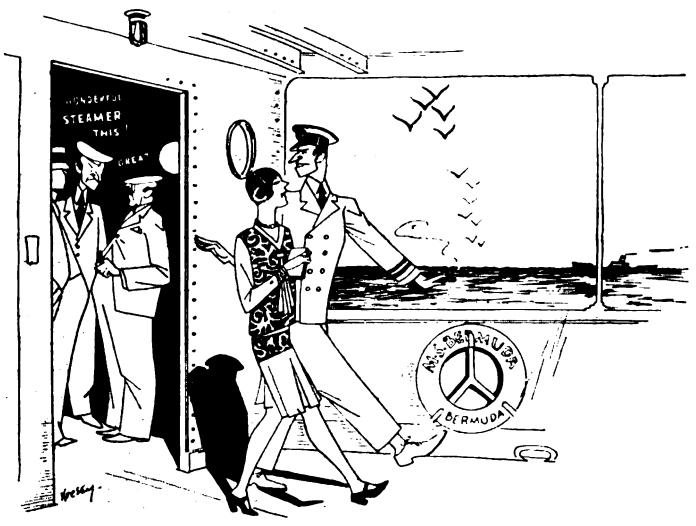
"Though the technical details of engineering and mechanics are beyond the comprehension of the layman passenger," said Captain Charlton. "He can at least thoroughly understand and appreciate the vast economies brought about by Diesel construction, when they are brought to his attention. An intelligent business man naturally deplores waste, whether of time, money or material. Aside from the more outstanding advantages, such as the saving in space, installation, operating and maintenance costs, what other superiorities would you emphasize?" he asked, and then in reply to his own question continued:

"More important than the appearance of a ship is her worthiness at sea, and matters below decks occupy much of a competent commander's attention. Facts that count strongly are that the lower rate of fuel consumption of Diesel machinery of equal power permits the storing of a smaller quantity of fuel, water and supplies. This saving in fuel space may be arranged for, because a motorship consumes much less fuel proportionately. Then too, the danger of accident to the engine-room crew is lessened. Not only is efficiency increased

by the almost entire elimination of the human element for stoking, but it adds materially to one's comfort and pride to know that the dirty work of the engine-room is now accomplished by man's trained intelligence applied through machinery rather than by brute strength."

We passed a group of people reclining in deck chairs directly beneath the after funnel. "A great recommendation, too, is the fact that the Diesel-driven ship is a thousand times cleaner than the steam vessel. No cinders or smelly smoke are spoiling their pleasure."

One recalls a voyage on a well-known steamship from New York to Cherbourg, when a few moments' rest on deck made one resemble the proverbial native of Pittsburgh,—a few additional seconds and Africa could claim one for her own. How many of us that travel oversea recall constantly shaking cinders off the pages of our book? The tremendous contrast between even the better-equipped steam vessels and the oil-engine ship was emphasized by a comparison of this recent trip on the BERMUDA with a voyage of the year before. On the steam vessel most unpleasant features were the very limited size of the state-rooms, and the fact that even the hardier travellers were affected by the steady rumble of machinery. At night while snatching a fitful sleep, the steamship creaked and trembled like a mammoth hammock swung by some gigantic hand. On the huge grey BERMUDA, which glided slowly and smoothly away from her pier, the first strikingly noticeable improvement was the ABSOLUTE LACK OF VIBRATION, AND THE SILENT WORKING OF THE ENGINES. Only by watching the passing panorama of the Manhattan skyline, and observing the kaleidoscopic shiplane traffic of the lower bay, could one be sure that she was gaining momentum and then moving steadily on her way. [When we made a previous trip we were unpacking in our cabin at sailing time, and were unaware that the BERMUDA had cast off from the pier until we went on deck—*Editor.*]



Not all of the 600 millimetre bores were in the engine room!

When I went below to inspect my state-room, and found it at least twice the size of one of equal tariff on a steamer, my thought was that many whose chief objection to sea travel has been the necessity for living in a tiny, stuffy cabin, will want to repeat frequently their first experience in motorship voyaging,—"motoring at sea without a duster."

The salvaging of cubic yards from the limbo of utter uselessness to be utilized for larger and more luxurious quarters is one of the primary reasons for the increased efficiency of the motor-vessel over the steamer. When a Diesel ship of less tonnage can provide the same amount of accommodation space as a bigger steamship similarly designed, the company running the Diesel-equipped ship will have not only more passengers, but more comfortable and therefore better satisfied ones.

Not so long ago,—less than a decade, in fact,—any ship-builder would have stated emphatically that steam was supreme as motive power for ships, though Diesel was challenging. The contender is today more than an equal competitor. [This is clearly indicated by our review of the progress of motor-liner construction given elsewhere in this issue.—*Editor*] What the public demands, the producer must supply, and the public is insisting upon the superior accommodations only possible to Diesel ships.

Tests Made of New Fire Fighting System.

A special demonstration of a new System of Smoke Detection used in conjunction with a means of freezing fire, was held for the benefit of the Steamboat Inspection Service at the plant of the General Carbonic Company in Long Island City, on Thursday, August 16th.

Mr. Dickerson H. Hoover, Supervising Inspector General, Washington, D. C., Captain Nils B. Nelson, Supervising Inspector, Ninth District, Cleveland, Ohio; Mr. John L. Crone, Supervising Inspector, Second District, were present, as representing the Steamboat Inspection Service.

A series of twelve tests were made using Fyre-Freez hand portable extinguishers in extinguishing fires of all sorts. The Fyre-Freez gas is ejected as a carbonic snow at a temperature of 110° below zero. The effect upon the fire is of smothering and its extinguishing properties were very effective. The standard Underwriters' tests for portable extinguishers were gone through with in a highly satisfactory manner.

In the plant of the General Carbonic Company, there had been installed a complete system of Smoke Detection, based on the Marr patents. This System was installed in a manner to imitate as closely as possible an installation aboard ship. It consists of the necessary blowers for exhausting the air, or drawing samples of air from each compartment protected, through Unit Detectors, located at stations where the extinguishing medium is turned on, and a series of Master Detectors that may be installed not only in the pilot house, but in additional locations, as the chief engineer's, the captain or chief mate's state-rooms.

Part of Ship Conversion Cost Deductible from Income Tax

Among the numerous items of saving which result from the conversion of ships to oil-engine propulsion is one which has not been given the importance that it deserves, although MOTORSHIP has drawn attention to the matter before. In drafting trial balances of expenditures and savings to be realized from a conversion of a steam propelling plant into one of the Diesel type, the value of the old machinery may be deducted from the profit and loss on income tax returns of the year in which the change is made.

Almost any kind of a scrapped plant may be given a proper valuation as of the date of scrapping, and will be considered as an item properly deductible from the gross income returns of the year. In general, the amount to be subtracted from the return would be calculated by deducting from the value of the old plant its depreciation rate times the number of years it has been in service.

Taxes saved as the result of such a deduction constitute a direct discount off the price of a Diesel installation, and cannot be neglected in making an accurate estimate of the cost of converting a steam or a gasoline vessel into one of the modern type. Anything that reduces the first cost of such work naturally makes financing easier, and effects continuous savings in interest charges.

Progress with a Coal-Burning Diesel Engine

Reports from abroad state that the Kosmos Engineering Works, Goerlitz, Germany, are developing an internal-combustion engine of the Diesel type to burn pulverized coal. It will be remembered that Dr. Diesel's original engine was designed with the same objective many years ago. It appears, however, that good progress is being made by the Kosmos works, and an experimental engine of fair size has been running for some time. Herr R. Pawlikowski had succeeded in getting regular combustion of pulverized coal in the engine as early as 1911. The war then interfered with further progress. An improved method of working was developed later, and an 80-hp. single-cylinder engine has been burning coal for four years in a power plant.

The thought of a coal-burning Diesel naturally brings to mind ash and residue in the cylinders, interference with lubrication and excessive wear. These difficulties have been encountered and overcome to a certain extent, we are told. Combustion is said to be so good that only the entirely non-combustible matter remains in the form of ash which is blown out with the exhaust gases.

The amount of pulverized coal required for each working stroke is filled into a "sluice-chamber" and mixed with a small quantity of air at normal pressure. Thereafter the chamber is closed and put under the working pressure of about 430 lb. per sq. in. within the cylinder. The contents of the chamber are then blown into the cylinder by a blast of higher pressure compressed air. Ignition occurs as in the ordinary Diesel engine. The coal dust is brought to a high temperature before it is delivered to the combustion chamber and is in condition to burn rapidly and regularly, thus making possible comparatively fast running.

Dredging New York State Canal by Diesel Power

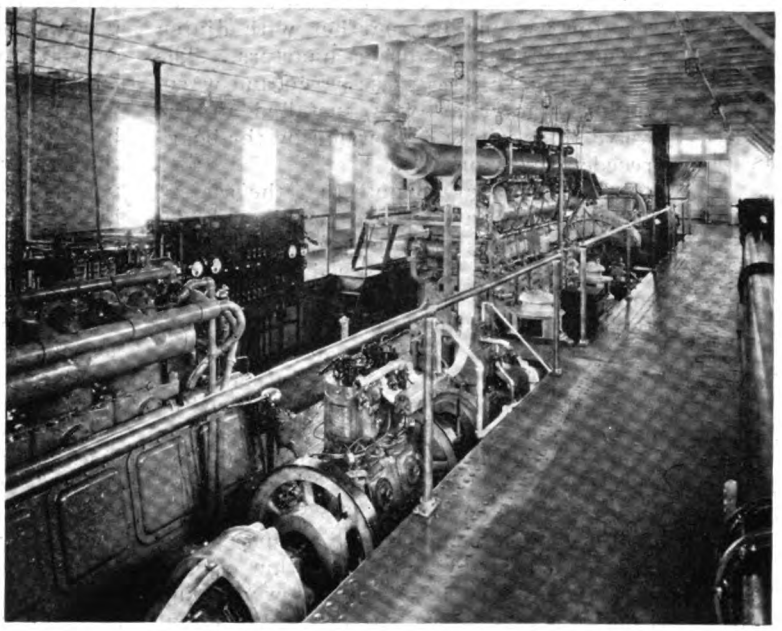
Advance Design Utilizing Drum Type Swing Joint Eliminates Bow Well

DURING the last few years the Department of Canals and Waterways of New York State has paid considerable attention to the economies and other advantages of Diesel power for its particular problems. Like the aftermath of most careful studies of this form of drive, adoption has resulted. There now are several Diesel dredges on the New York canal in the service of the State, and some new Diesel ferries and tugs in hand, aside from privately-owned motor tugs.

A new Diesel hydraulic dredge, thoroughly modern in every detail has just been put into operation on the canal. As were the other dredges, she was designed by the State, and was built at Syracuse under the supervision of Major T. F. Farrel, Commissioner of Canals and Waterways; Col. Wm. M. Acheson, Chief Engineer of the Division of Engineering, and Guy W. Pinck, District Engineer, the latter being in direct charge.

The hull, 106 ft. long by 28 ft. beam by 8 ft. in depth, has in addition to the usual transverse frames and intercostals, a pair of 15 in. channels extending from the pump casing to the after well bulkhead. These channels serve as foundation girders for the pump and engine, as well as for the generating unit. Supplementing these are two other channels extending from the forward end of the pump engine to the after end of the generating engine. They are capped with one-inch steel plate, forming a box girder on either side upon which the engines are set. Since the flywheels are small enough to clear these girders, without cutting, the dredge has a very rigid backbone. With the exception of a wooden deck house, the construction throughout is of steel.

By employing the drum-type of swing joint in the pump suction line and by mounting the cutter motor on the ladder, it has been possible to eliminate the usual bow well. On the forward deck a four-drum American hoist, geared to a 25 h.p. motor, takes care of the forward spuds, the ladder and the boom hoists on the after deck. A two-drum hoist, geared to a 10 h.p. motor, takes care of the after spuds. A 40 h.p. ventilated motor, drives the cutter at 20 r.p.m., through a 30-1 reduction, the motor controls along with an ammeter being in the operating room. This enables the operator to judge the character of the material he is cutting.



The engine room is well lighted and spacious

Fuel is carried in ten elliptical-shaped tanks, five on either side of the well under the main decks, with a total capacity of 25,000 gallons, or enough for about 650 hours under full power.

The pump engine is a Bessemer six-cylinder four-cycle airless-injection Diesel, developing 500 b.h.p. at 275 r.p.m., direct connected through a Francke floating-ring flexible coupling to a 15″ Morris centrifugal pump capable of delivering 200 cubic yards of solids per hour against a 40′ head (pumping 10% solids). With a fine loose material the pump handles up to 25% solids.

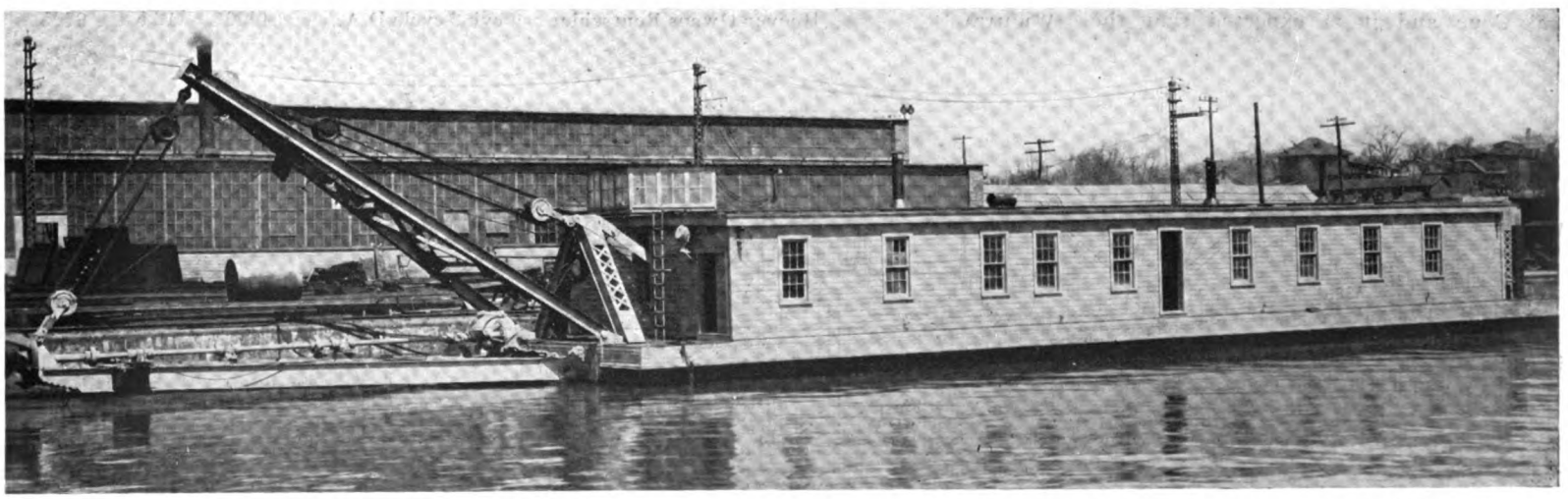
The auxiliary Bessemer Diesel engine is direct connected to a 100 K.W., 250 volt, D.C., General Electric generator, which supplies current for lights and auxiliary machinery. An emergency unit consists of a Hill Diesel with an 8 K.W., 250 volt generator on one end and a 5½″ x 2¾″ x 5″, two-stage air compressor on the other, and also a 4″ Gould centrifugal pump.

Two 4″ Morris vertical centrifugal general-service pumps supply water pressure for a Schutte and Koerting ejector, which primes the dredging pump, and furnish cooling water for the engine. One of these units is in reserve under normal operation.

Two 10 G.P.M. motor driven Viking pumps are used for transferring fuel and lubricating oil. A DeLaval centrifuge is used in the lubricating oil system. Reed air filters are fitted to both pump and generator Diesel engines, as all canal dredges are frequently operated in the vicinity of dry sand banks. Exhaust pyrometers are used throughout.

All motors, generators and switchboards are General Electric manufacture as well as the starting equipment. All are of push button type, excepting the hoist and cutter motors, making the installation very handy for the engineers.

The overall height is necessarily low, being 18 ft. from bottom of hull to top of house in order to get under bridges. Everything above this height is easily dismantled.



Dredge No. 4. Special design permits passage under low bridges. Note direct cutter drive motor mounted on ladder

Bids for Eight More Dieselizations

Diesel Power Will Increase Net-Cargo Capacity Although D.W.C. Will Be Reduced by About 300 Tons

THE U. S. Shipping Board has released plans and specifications to 12 shipyards for the conversion of eight additional steam ships to Diesel power. Their Diesels were ordered some months ago. The vessels to be converted are the so called Doullut and Williams type of oil burning steel steamers. When the work of conversion is completed these vessels will have a deadweight capacity of about 9300 tons. They are the CITY OF ELWOOD, GALVESTON, JEFF DAVIS, NEW ORLEANS, OLDHAM, POTTER, WARD AND WICHITA. General specifications of these ships as steamers are as follows:

Length between perpendiculars	395′ 6″
Beam	55′
Depth	34′ 11″
Draft, loaded summer	27′ ½″
Shaft horsepower	2,640
Bale cargo, cubic feet	452,745
Fuel capacity, permanent bunkers (oil), tons	1,528
Approximate normal sea speed, in knots	10.75
Estimated daily fuel consumption, tons	35
Normal steaming radius, knots	11,250
Type of construction	Isherwood

Inquiries were sent to the following yards: Todd Shipyards Corporation, Morse Drydock & Repair Company. W. & A. Fletcher Company, Newport News Shipbuilding Company, Bethlehem Shipbuilding Corporation, Federal Shipbuilding Corporation, American Brown-Boveri Electric Corporation, Sun Shipbuilding Company, Staten Island Shipbuilding Company and United States Navy Yards at New York, Boston and Philadelphia.

The Maryland Drydock Company of Baltimore, Md., was low bidder. Bids were submitted by The Bethlehem Shipbuilding Corporation, The Federal Shipbuilding Company, The Morse Dry Dock and Repair Company, Newport News Shipbuilding and Dry Dock Company, Sun Shipbuilding Company, Todd Shipyards Corporation, U. S. Navy Yard at Boston, and U. S. Navy Yard at New York. The bids were forwarded by Captain Gatewood to Admiral Cone and it is expected that the latter will make awards in the near future.

The work to be done includes the removal of the present turbines, gears and boilers, with the foundations, and all auxiliary machinery from the engine and boiler room spaces, and the installation of the new engines and auxiliaries. The forward house on the bridge deck will be fitted up in each case for passengers, together with dining saloon, pantry and other quarters. The boats will have all-electric cargo and warping machinery, as was installed in the twelve ships whose conversion by the board preceded this work.

It is interesting to note that the rate of fuel consumption of these vessels will decrease from about 35 tons per day to about 20 tons per day, and the speed will increase from 10.75 knots to an estimated 12.5 knots, giving a net estimated increase of 1.25 knots on one-half the fuel. Actual sea performance of the first 12 converted ships indicates that the Board's estimated speed of these last eight vessels after conversion is very conservative. It is reasonable to expect that they actually will be capable of maintaining from 13 to 13.5 knots.

To accomplish an increase in speed comparable to this, by the installation of new steam machinery of greater power would result in a very heavy rate of fuel consumption, and the ships having to carry nearly as much fuel as cargo. The exact amount, while not capable of exact determination except by actual test at sea, may be conservatively estimated at from 55 to 60 tons per day.

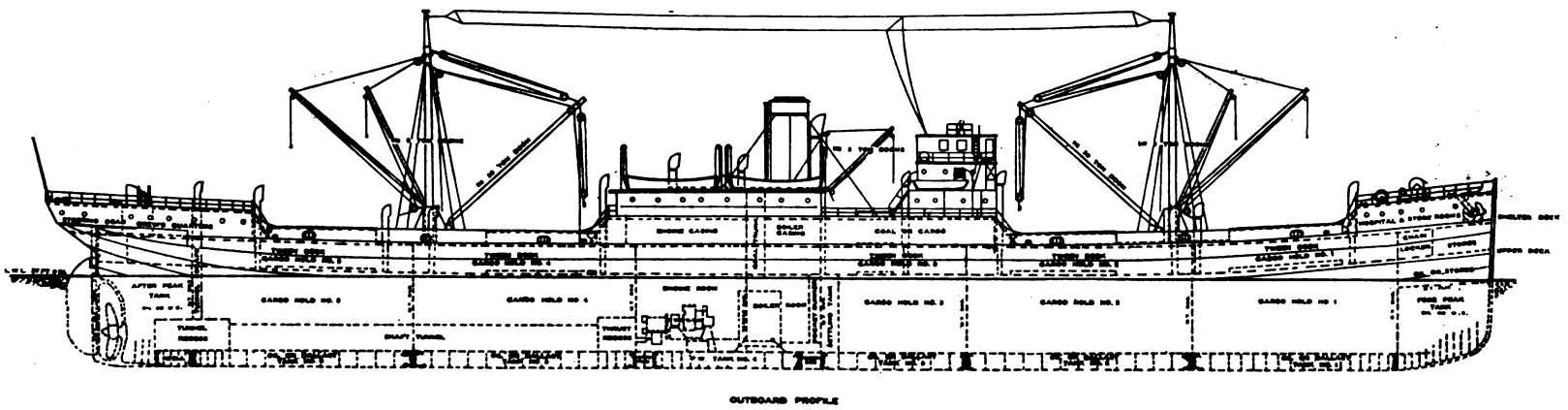
This would decrease the existing cruising radius to about 6500 miles in place of increasing it as will be the case with the Diesel installation, to about 19000 miles, without increasing the capacity of existing fuel tanks. Therefore to make of these vessels, steamships capable of meeting the present day demand for fast freight ships, it would be necessary to increase the bunker capacity, or face the problem of purchasing high priced fuel abroad. It is known that with a large cruising radius advantage may be taken of low prices for Diesel fuel at the Panama Canal and in other American ports. Steamer fuel purchased abroad is higher priced than Diesel fuel at home bunkering stations.

Another important angle of these conversions, as related to the cruising radius, has to do with the deadweight capacity. It actually will be reduced through the installation of Diesel engines, which weigh more than the lower powered steam machinery being removed. The d.w.c. estimate is based upon a fuel load equal to the weight of fuel carried and required by these ships when steamers. But to merely equal steamship cruising radius eliminates the need of carrying full bunkers. In fact the motorship will actually be capable of carrying a greater weight of net cargo of certain classes, because the rate of fuel consumption per day is less and as she will require less days to travel the same distance.

Particulars of the engines and speed expected are given in the following table:

Ships to Be Converted

Name of Ship	Make of Engine to be Installed	Type	Power	Speed Expected	Present D.W.C.
CITY OF ELWOOD	Busch Sulzer	6 cyl. 2 cycle S.A.	3950	12.5	9681
GALVESTON	McIntosh & Seymour	5 cyl. 4 cycle D.A.	3900	12.4	9520
JEFF DAVIS	Worthington	4 cyl. 2 cycle D.A.	3625	12	9679
NEW ORLEANS	Hooven Owens Rentschler	4 cyl. 2 cycle D.A.	4000	12.5	9724
OLDHAM	McIntosh & Seymour	5 cyl. 4 cycle D.A.	3900	12.4	9650
POTTER	Worthington	4 cyl. 2 cycle D.A.	3625	12	9680
WARD	Busch Sulzer	6 cyl. 2 cycle S.A.	3950	12.5	9704
WICHITA	Hooven Owens Rentschler	4 cyl. 2 cycle D.A.	4000	12.5	9705



Outboard profile of design No. 1037. *Oil-burning Shipping Board steamers, eight of which are being equipped with Diesel power*

Big American Motor Tanker Sun Goes to Sea

LAST month we referred to the launching on July 14th of the SUN, a new Diesel motorship of 13,486 tons d.w.c. at the Sun shipyard, Chester, Pa. This ship is a duplicate of the SUNOIL illustrated and described in our issue of Dec. 1927.

The latest tanker is noteworthy for the rapid manner in which she was finished and sent to sea after the launch, for she started on her maiden voyage from the Delaware on July 29th. This is better than wartime speed, particularly when it is considered that the SUN has the following dimensions:

Deadweight capacity	13,400 tons
Cargo tank capacity,	4,800,000 gal. (16,326 tons)
Dry cargo capacity,	48,597 cu. ft. (1214 tons)
Total cargo capacity	17,540 tons (approx.)
Fuel oil capacity	611 tons
Power	2,800 s.hp.
Speed, loaded	11 knots
Length, overall	497 ft. 0 in.
Length, bp.	480 ft. 0 in.
Breadth, molded	65 ft. 9 in.
Depth, mld. to upper deck at side	37 ft. 0 in.
Depth, mld. to 2nd deck at side	24 ft. 6 in.
Draft, loaded	27 ft. 2 in.

Her propelling machinery consists of one single-acting, 2-cycle Sun-Doxford opposed-piston oil engine delivering 2,800 s.hp. at 80 r.p.m. from four cylinders each 23.62″ diameter by twice 45.66″ stroke. The scavenging air pump is direct driven from the crankshaft between two pairs of main cylinders. A heat exchanger, or exhaust gas-fired boiler, is installed to utilize the waste heat from the main Diesel engine. The heater is connected to the main boiler so that the temperature of the water in the boiler will be such that steam can be quickly raised without causing undue stress in the boiler. This heater is used at sea for generating steam for heating the ship and to furnish steam for other sea going requirements. In addition, one oil-burning boiler of 3990 sq. ft. heating surface is fitted in the aft part of the engine-room. This boiler is fitted for the operation of heater coils, steam cargo pumps and other steam auxiliaries.

Diesel-driven tanker Sun, largest motorship launched in America this summer, slipped down the ways on July 14th, and was delivered to Sun Oil Co. July 27th. Loaded displacement is 18,900 tons

Particular attention has been paid to the settling and purifying of both lubricating and engine fuel oil, a battery of tanks for purifying and settling so arranged that the fuel and lubricating oils are undergoing a thorough and continuous purifying process. Two Sharples closed-type centrifuges are fitted for this purpose.

The vessel is of the two-deck type, with full poop and top gallant forcastle, built with a straight stem and semi-elliptical stern, on the longitudinal system of construction. The propelling machinery is located aft and in general, the arrangement follows what has become practically the standard design for oil-carrying vessels. There are 12 pairs of main oil compartments of which the longitudinal sub-division is provided by a continuous centerline bulkhead. Six summer tanks are arranged in the 'tween deck on each side, which are used when the vessel is engaged in the transport of light oils. Pump room is located amidships. Two cofferdams separate the entire oil cargo from the remainder of the ship. Fuel oil is carried in the deep tank aft and also in the double bottom aft. A hold for the carriage of 48,597 cu. ft. or approximately 1214 tons of general cargo is located immediately abaft the forepeak.

Owing to the speed with which the vessel was finished, photographs were not taken prior to the time of her leaving port so we are unable at this time to give more than the illustration of her launching. We expect that photographs will be available later.

S. P. Eastman Heads Atlas Imperial

Plans to expand the activities of the Atlas Imperial Diesel Engine Company of Oakland, California, are expected to follow the recent appointment of S. P. Eastman as president and the enlargement of the Board of Directors. Mr. Eastman is president of the Spring Valley Water Company and a director of the Wells Fargo Bank and Union Trust Company of Oakland.

The former directors who will remain on the board are A. Warenskjold, president of Atlas Diesel, J. W. Lorimer, vice-president, and Mr. E. Wright, secretary and treasurer, Max M. Cohn, chairman of the board of Illinois Pacific Glass Corporation, and Gustav Epstein, partner in J. Barth & Co. With the election of Mr. Eastman to the presidency, Messrs. Warenskjold, Lorimer and Wright, the founders of the business, will become vice-presidents.

The new board of directors has been augmented by the addition of F. W. Bradley, president of Bunker Hill and Sullivan Mining Company and Alaska Treadwell Company; Atholl McBean, president of Gladding McBean & Co. and a director of Crocker First National Bank; Milton Esberg, president of General Cigars Company and a director of American Trust Company; Clay Miller, head of Clay Miller & Co., and a director of United Security Bank and Trust Co. President Eastman will also be on the directorate.

S. P. Eastman

Canadian Diesel Vessel Construction Active

Rapidly Developing Market Shown by the Number of Motor Vessels Recently Put in Service

WITH the recent launching of the towboat ATACAS at the Roger Miller yards at Toronto, Ont., the the John Inglis Company has now turned out five all-steel Diesel tugboats for the Canadian International Paper Company. The ATACAS is 70 feet over all, with a breadth of 16 feet, and is being powered with a 210 s.hp. Fairbanks-Morse Diesel engine connected to a Kennedy propeller. On acount of the low operating costs to date of the Diesel-engine tugs, it is predicted by the designer, Col. Geo. H. Johnson, that no more steam tugs will be built for the Canadian International Paper Company.

While these small Diesel-driven tugs are of quite a litle interest, a more important event was the launching of the most powerful Diesel-driven tug yet built in Canada. This was the GEORGE M. MCKEE just completed for the Anticosti Corporation for towing logs in summer just off the Island of Anticosti, and for use during Winter as an icebreaker to maintain communication between the Island and the mainland. She has been built at the yard of the Davie Shipbuilding and Repairing Company at Lauzon, Quebec, and is powered with a 700 s.hp. Fairbanks-Morse Diesel engine, turning at 250 r.p.m. This engine is of particular note as it has *five* 16 in. by 20 in. two-cycle cylinders.

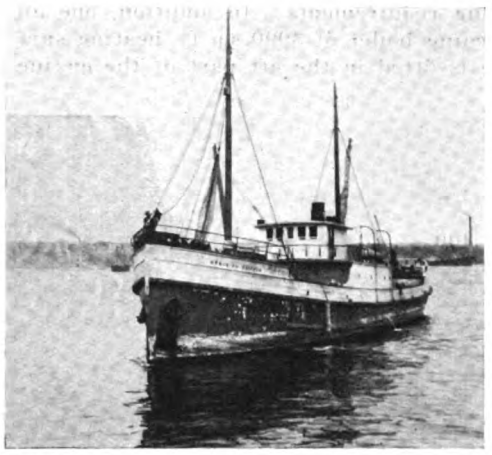
For auxiliary purposes there is a 36 kw Fairbanks-Morse Diesel generator set. All the auxiliary equipment is electrically driven, including the anchor windlass and warping windlass. In fact, the warping winch on the main deck can carry one mile of half inch wire cable.

The tug has the following dimensions:

Length overall .....107′
Length B. P. .....100′
Breadth moulded ..... 22′
Draft loaded .....9′6″
Power ....700 s.hp.
Speed .....14 knots

Sufficient fuel is carried for 4,000 miles radius. The speed, light, is 14 knots, but with a big tow nearly two miles an hour, which is said to be somewhat faster than is usual with an open boom. In order to make this speed without loss of logs, a special type of boom has been used.

At the luncheon held in the Chateau Frontenac, Walter Lambert, of Montreal, designer of the tug, in speaking of the respective merits of internal-combustion and steam engines for marine propulsion, said—"The shipbuilding industry is passing through a transition period. The time has gone when it was problematical whether the old methods should be followed. The man who adheres to steam runs a greater risk today than he who installs Diesel machinery, which is economical in operation and substantial in construction. The Anticosti Shipping Corporation could not have made a more wise decision than to adopt the internal-combustion engine as her means of propulsion."



Dominion Shipper, operating as a small freighter between Halifax and the Magdalen Islands. One of five twin-screw Fairbanks-Morse Diesel engine craft owned by the Dominion Steamship Company

As a support to the remarks of Mr. Lambert we make reference to the 123 ft., by 26 ft., by 90 ft., 240 b.hp. 10¼ knot steel ferry KIPAWO, described in MOTORSHIP some months ago. Every month this vessel makes 26 trips of three hours forty-five minutes duration each. The fuel costs of this boat are but $5.80 per trip, compared with $13.13 for the steam ferry formerly used on this service. The KIPAWO operates on Minas Basin, Nova Scotia, between Parrsboro, Kingsport and Wolfville.

Walter Lambert recently designed a general service and salvage boat named the FOUNDATION JUPITER, for service in the St. Lawrence River and St. Lawrence Gulf, for the Foundation Company of Canada, from sketches and data supplied by R. E. Chadwick, Vice President and General Manager of the company. This vessel was recently completed and is equipped with two Kromhout surface-ignition oil engines of 200 s.hp. each, connected to the propellers, with reverse gear and clutch at the after end.

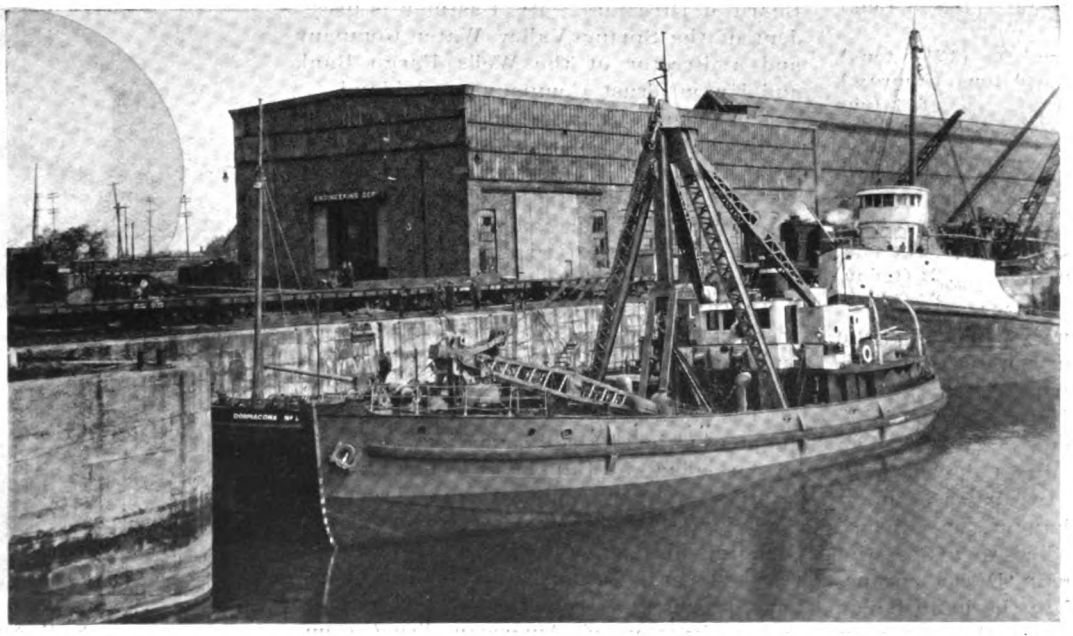
At the forward end of each engine there is also connected by clutch a 170 KVA 550-V. 60-cycle, 3-phase English Electric generator. The current generated by these machines is used in operating the hoisting engine on the main derrick, swinging engine and compressors.

There will also be plenty of electric power available for use over the ship's side. The ship's lighting is taken care of by a Kromhout auxiliary oil-engine connected on one end to a 110 volt D. C. generator. At the other end the engine is connected to an air compressor. Ample provision is being made to work at night by the installation of a search light and flood lights.

A steel derrick with a lifting capacity of 50 tons at a radius of 48 feet is provided. For loads not exceeding 25 tons, the boom may be extended to 60 feet. A two cubic yard clamshell bucket operates off this derrick for dredging purposes. A four-drum electric hoisting engine actuates this derrick, the hoisting engine being set below deck. A separate swinging engine has been provided for swinging the boom of the derrick. The derrick hoisting engine and swinging engine were supplied by the American Hoist & Derrick Company.

This new vessel is 140 feet long by 35 feet breadth and 11 feet 6 inches in depth. She is built of steel and especially designed for ice conditions. Accommodation is provided for a crew of 15 men, but by using a portion of her 400-ton cargo space, provision can be made for housing and feeding 50 men aboard for special salvaging operation.

An ample storage of compressed air for salvage and other special work is also provided.



Foundation Jupiter, Diesel-driven salvage and service boat operating on the St. Lawrence River

Interesting News and Notes From Everywhere

FOR naval purposes the German Government has ordered a marine set of eight Diesel engines aggregating 70,000 s.hp. They will be coupled to four propeller shafts.

Keel of the 25,000 tons Diesel-driven passenger liner for the Compagnie Generale Transatlantique has been laid at the Penhoet yard, France, of the St. Nazaire-Penhoet Co. Ltd.

Lawleys are constructing a 115 ft. motor yacht for George Whitney of New York, from designs by Gielow of New York, to have twin 300 hp. Bessemer Diesel engines.

Burmeister & Wain, Ltd., of Copenhagen, Denmark, are constructing a new double-acting, 2-cycle Diesel engine.

"By advancing the cost of up-to-date propulsive machinery, your publication, MOTORSHIP, is doing excellent work for the American Merchant Marine."—*T. V. O'Connor, Chairman, U. S. Shipping Board.*

For a duplicate in size and speed of the passenger motorliner SANTA MARIA to be built in the United States, the Grace Line of New York, are asking prices covering Diesel, Diesel-electric, turbo-electric, and single-reduction gear turbine drives.

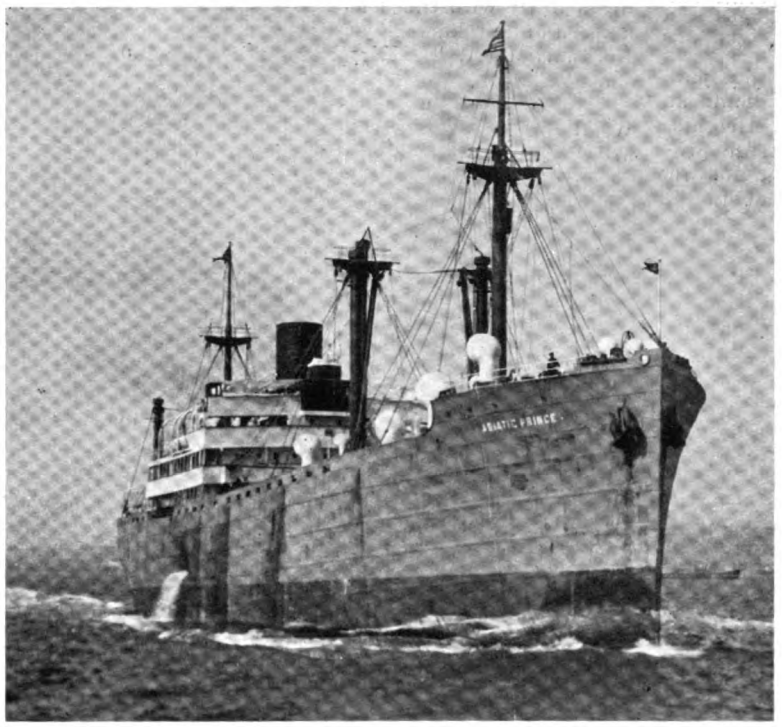
The Delaware Pilot Association is having built a new pilot boat at the Abbot Shipping Yard, Milford, Delaware. She will be powered with a Bethlehem Diesel of 360 h.p. It is expected that delivery will be made about November first.

Several years ago MOTORSHIP described the 102 ft. river towboat TROJAN, powered with a 200 hp. Fairbanks-Morse Diesel engine, and owned by the Vesta Coal Company. Since the TROJAN was placed in service in 1923 she has towed over 3,500,000 tons of coal, or the equivalent of 70,000 carloads of 50 tons each.

An order was placed recently by the Holland-American Line with the Wilton Engineering and Slipway Company for the construction of a 14 knot motorship of about 12,000 tons d.w. capacity. The vessel will be powered with two Harland-B. & W. Diesels. She will have a capacity of 140,000 cu. ft. of refrigerated space, and accommodation for a dozen passengers. The vessel will be put in Pacific Coast service in the Fall of 1929.

Forty-four days out of New York the motorship MALAYAN PRINCE of the Prince Line, arrived at Manila, P. I. This is a very fast trip. She made Yokohama in 32 days, Kobe in 34 days, Shanghai in 38 days and Hongkong in 42 days.

The motorship SANTA MARIA of the Grace Line has caused radical changes in the tide of marine traffic to South America. SANTA MARIA entered service last spring and has continued to carry her capacity of 156 passengers throughout the summer; although previously the mid-year passenger traffic has been far from capacity. No wonder her owners plan to build a sistership in America.



Another mystery of the sea. Like the Waratah and the Cyclops, the new motorship Asiatic Prince put to sea and was last reported on March 29th. Not a word has since been heard from her or a piece of wreckage seen

Owned by B. A. Massee of Chicago, the Diesel yacht MARGO II is 98 ft. long, 17 ft. 6 in. beam and 6 ft. draft. Two light weight Winton Diesels of 200 hp. each give her a speed of 15½ m.p.h.

The African Steamship Company have placed an order with Harland & Wolff for a passenger motor liner for their West African Express Service. The new vessel will be similar to the M. V. APAPA, but with all the latest improvements and will be constructed at Belfast. She will be 9,400 tons gross, 468 ft. 9 ins. long, 62 ft. beam, and 35 ft. deep, with a cruiser stern and six decks. Accommodation will be provided for nearly 500 passengers and crew. The propelling machinery will consist of two 3,750 s.hp. Harland-B. and W. six-cylinder, four-cycle, double-acting Diesel engines.

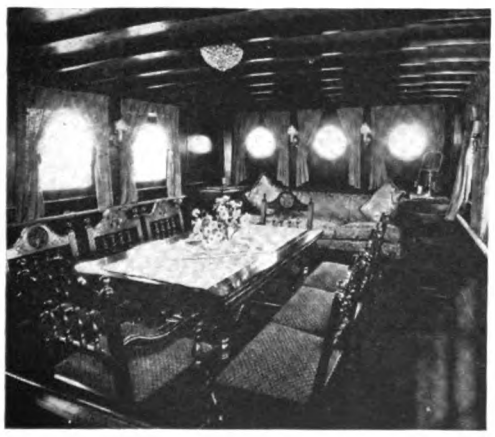
AUGUSTUS the world's largest and most powerful motorship is scheduled to arrive at New York, Friday, September 7th. She will replace the ROMA an Italian steamship of the same line, which will be placed in service between Italy and the East coast of South America.

Niles-Bement-Pond reduction gear drive is to be used on a tug with a 300 hp. Standar Diesel engine. This tug is being completed at the Kingston Dry Dock Company Yards, Kingston, N. Y.

Now under construction for H. D. Lloyd of Boston, is a 110 ft. schooner yacht from designs by John G. Alden. The same yard is also building an 86 ft. Diesel yacht for Henry A. Morse of Boston from designs by Eldridge McGinnis of Boston and a 102 ft. motor yacht for Robert F. Herrick of Boston, both to have Winton Diesel engines.

There are now two Diesel ferries in service in Florida between Matacumbie and No Name Key, a distance of 40 miles. A roadway is being completed along an island lying between these two points which will shorten the distance to be traveled by boat, but will mean two short ferry services instead of one long ferry service. It is possible that an additional Diesel boat may be built and placed in service.

The National Safety Council will convene in New York October 1st-5th inclusive. It is expected that more than 5,000 delegates from different parts of the world will attend. Over 270 speakers are on the program. One of the leading sections of the N. S. C. is the Marine Section which has attracted considerable attention through its excellent work in the prevention of injury to men employed aboard ship and in connection with ship work.



Winton-engined Margo II above; dining saloon on the left and afterdeck on the right

Practically every motorvessel today carries one or more launches equipped with gasoline engines. In the interests of the operators of these engines, a booklet has been issued by the Vacuum Oil Company entitled "Correct Lubrication for Motorboat Engines." A copy will be sent to anyone who writes to the Marine Sales Department of the Vacuum Oil Company, 61 Broadway, New York, N. Y. Mentioning MOTORSHIP will be considered a courtesy.

The two 4,000 s.hp. Sulzer Diesel engines under construction for a French submarine mother ship will turn at 220 r.p.m. In addition to these powerful units, there are six 3000 s.hp. Sulzer Diesels building for the French Navy.

Three more passenger motorliners have been ordered by the N. Y. K. Lines for Pacific ocean service. They are of 20,000 tons displacement. Whereas the three big motorliners building will run out of San Francisco and Los Angeles, the newer craft will operate out of Seattle.

Recently we were enabled to see the first pair of Trieber-Speedway Diesel engines built at the Consolidated Shipyard, Morris Heights, New York City. When completed these propulsion units will be installed in a 106 ft. motor yacht building to the order of L. M. Wainwright of Indianapolis.

For service on the river Ob, Siberia, the Russian Soviet Government has just placed a contract in Germany for a twin-screw motorvessel of 1,600 s.hp., says the U. S. Dept. of Commerce. One point of interest is that her two four-cycle reversible Diesels will each have *seven* cylinders.

Two more motorships have recently been ordered abroad by an American firm. We refer to two 5,000 tons gross passenger and fruit carrying ships to be built for the Standard Fruit & Steamship Corp. of New Orleans by the Cantiere Navale Triestino. Fiat Diesel engines will be installed.

While steamships are being sold by the Shipping Board at $6 per ton, it is difficult to see how private shipowners can afford to order new motorships of similar type. We refer to the recent purchase at that figure of four inactive Hog Island, 7,825 d.w. ton vessels by Moore & McCormack's American Scantic Line.

Hamburg-American Line's new 13-knot motorship Leverkusen of 7300 gross tons has extensive cargo space and accommodation for 24 passengers

CASTOR, the largest vessel ever built in Sweden is an oil-carrying motorship. Her hull was launched by the Kockums shipyard at Malmo, in May 1928. She was the first of two tankers ordered by the Tralleborgs Angfartygs Nya Aktiebolag. The CASTOR is divided into 30 tanks and is 465 ft. 6 in. long. She is built on the Isherwood Bracketless system, and is calculated to load 12,300 tons, having a draft with this load of 26 ft. 7 in., and a speed of 10.5 knots. She is equipped with two Kockums-M. A. N. Diesel engines of 3,300 s.hp.

W. H. Butler, formerly located at the Standard Oil Company of New Jersey Research Laboratory at Bayway in charge of testing internal combustion motors, is now located at New York with the Fuel Oil Division of the Company for the purpose of assisting—gratis—Diesel-engine owners and operators with any problems in operation of Diesel engines.

A combination tug and inspection boat with Diesel-electric drive, in which two 150 b.hp. Diesel generating sets will be used, is planned by the U. S. Corps of Engineers for service in the vicinity of Florence, Alabama. It is proposed to advertise bids for the machinery before completing the plans of the boat and thus make the final plans conform to the particular design of Diesel machinery selected. Meanwhile tentative plans for the hull construction have been completed. The length will be 149 ft. 6 in., beam 28 ft. 3 in. and draft 2 ft. 10 in. Split paddle wheel, chain reduction drive has been decided upon.

Addressing the American Chamber of Commerce in London, Lord Kylsant recently stated that his company now has built or building 90 motorvessels of over 560,000 tons gross register, and that the motorship has came to stay. Another statement made by Lord Kylsant in this address was that the engine problem for the new thousand foot White Star Liner as yet remains unsolved. "Naturally, at a time when so many developments are taking place in marine propulsion," Lord Kylsant said, "the question of the type of engines for such a big ship presents a problem of considerable magnitude. No pains will be spared to secure propelling machinery of the most important character."

Since then Lord Kylsant cabled us confirming that decision has yet to be made. It is evident from this that the White Star Line is not unhesitatingly jumping to steam but are giving deep consideration to Diesel power—in fact the engine designs have been completed.

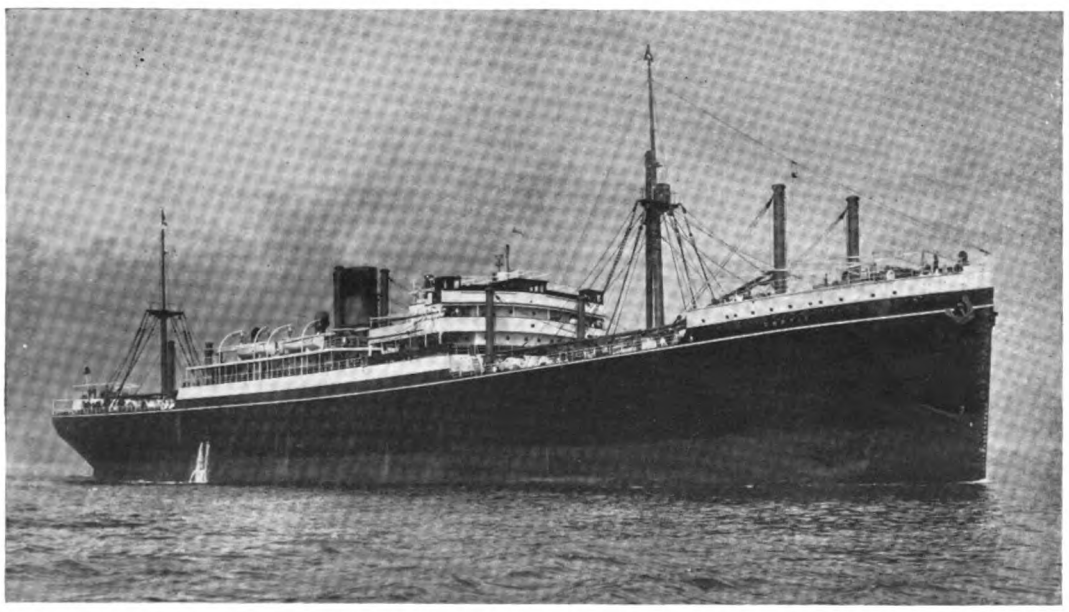
The White Star Line also has under construction, two motorliners of 26,000 gross tons register for Transatlantic service.

The first double-acting 2-cycle Diesel engine to be built by the A. E. G. of Berlin has been installed in the Hamburg-American Line's new motorship LEVERKUSEN, built for the East Asiatic service. Her speed is 13 knots and her 6-cylinder engine is of 4500 to 5100 s.hp. The gross tonnage is 7,300, and in addition to cargo she has accommodation for 24 passengers.

The General Electric Company have developed a new signal relay, designed for application where a small inexpensive device is needed to actuate a warning signal when power fails or voltage drops. The relay is of the solenoid type having a laminated armature of three sections, a central leg of which is fastened to a Bakelite operating arm which raises and lowers the contact tips. When used as a voltage drop warning device adjustment for the proper operating voltage is made by means of an adjustable brass screw and a very fine adjustment of pick-up and drop-out may be obtained. On storage-battery charging outfits it places the battery on charge—or increases the charging rate and disconnects automatically.

Transport Division of the Bureau of Foreign and Domestic Commerce at Washington reports as follows: "Two motorships have been launched for the San Marco Navigation Company at the Stabilimento Tecnico Triestino, Trieste. The San Marco Navigation Company operates a line of mail boats from Venice to ports in Dalmatia, Greece, Rhodes and nearby regions. They have named their new vessels FELIPE GRIMANI and PIETRO FOSCARI. These vessels are alike in construction and technical equipment. Their specifications are: Length 310 ft., beam 43 ft. 8 in., draft 19 ft., gross tonnage 3300, horsepower 3900, speed (trial) 15.4 knots. They will be placed on the Venice, Brindisi, Rhodes, Smyrna run of the company. (Vice Consul John E. Holler.)"

The motorship ST. LOUIS was successfully launched on August 2nd at the Bremen Vegesack yard, Germany. She is one of two 16,000 gross tons ships building for the Hamburg-American Line's New York-Hamburg service, and will have accommodation for 1147 passengers, in three classes. One noteworthy



Coptic, a new 15-knot, 7450 s.hp. Shaw, Savill, Albion cargo motorliner powered with twin 3725 s.hp. Wallsend-Sulzer Diesels. Fuel consumption 30 tons. Builders, Swan, Hunter & Wigham Richardson

feature of the ST. LOUIS is that she will be a twin-screw ship with two *double-acting*, 2-cycle M. A. N. Diesel engines of 3100 s.hp. on each shaft driving the propellers *through reduction gears*. As published in our April issue last, each engine is a 6-cylinder unit of the 2-cycle type, 19 in. diameter by 26 in. stroke, turning at 225 r.p.m., but the propellers turn at 110 r.p.m. and together give a power of 12,400 s.hp.

Now nearing completion at the yard of A. B. Story, Essex, Mass., is a 120 ft. schooner yacht to the order of W. A. Shaw, Chicago, Ill.

A single-cylinder, double-acting Diesel engine developing 1200 s.hp is about to be constructed by the Sun Shipbuilding & Drydock Company.

A four-cycle, double-acting Kincaid-B. & W. Diesel engine of 4,500 s.hp. is installed in the new 9,500 tons d.w., 14-knot motorship CLAN MCDONALD, the first Diesel vessel to be built for the Clan Line.

On July 1, 1928, American shipyards were building or under contract to build for private shipowners 396 steel vessels of 225,740 gross tons, according to the Bureau of Navigation, Department of Commerce.

The Hamburg-American Line announces that its new Diesel geared-drive motorship ST. LOUIS will sail for New York December 6th on her initial voyage. December 27th will be the date of sailing from New York for Europe. Her machinery is of particular interest.

The big motorliner MONTE CERVANTES, which recently struck a rock in the northern waters, but was successfully floated, is propelled by four M. A. N. Diesel engines driving the propeller shafts through reduction gears. An illustration of one of the engine sets was given in MOTORSHIP for April last.

The manufacture and sales of the Strombos air siren for motor-vessels of all types has been taken over by J. Thos. Rhamstine, 500 East Woodbridge St., Detroit, Mich., to whom all communications regarding Strombos horns should now be sent.

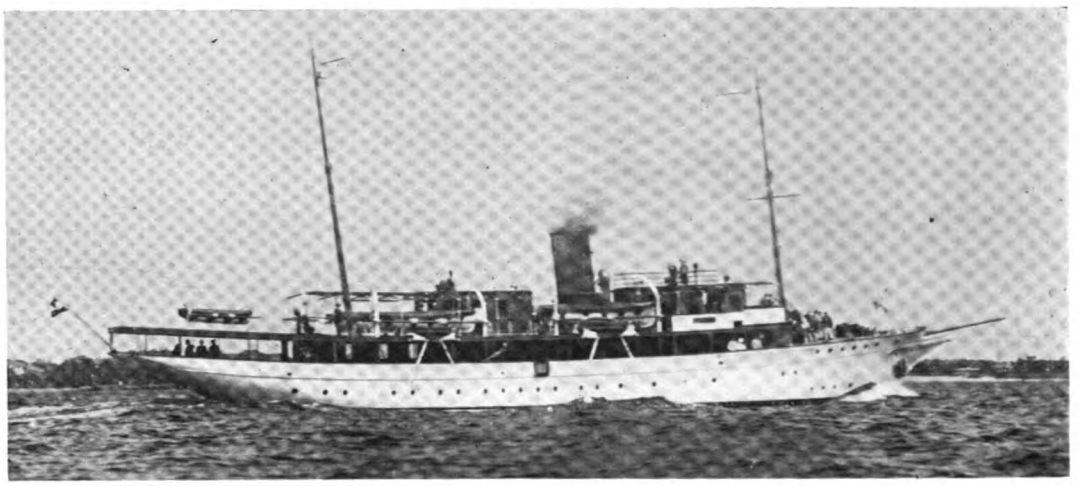
One of the several motor-tankers building in England for the Gulf Refining Co. of Pittsburgh, Pa., is now in service. She is of 15,300 d.w. tons, is built to the Isherwood system, and is equipped with a Richardson-Westgarth-Doxford opposed-piston Diesel engine. On trials a speed of 12 knots was developed.

Some months ago the Clark Dredging Co. of Miami, Fla. scrapped the boilers and steam machinery of their 150 ft. dredge DAVIS, and installed an 840 hp. Fairbanks-Morse Diesel engine. Substantial reduction in operating costs have already been shown. The vessel operates at Ft. Pierce, Fla.

The U. S. War Department has adopted a new plan for vessel construction that is quite in sympathy with the suggestions incorporated in our article on page 690 of our August issue. Instead of calling for bids on hulls and machinery simultaneously, bids for Diesel engines will first be advertised, and hull plans then will be made to conform with the power plant. Shipowners please note!

Work is progressing satisfactorily on the 1,620 ton gross twin-screw passenger-cargo motorship CONDAD DEL SOL, building by Harland and Wolff at their Govan shipyard, and launched July 25. Cargo holds forward and aft, will be worked with steel tubular derricks and electric winches, but the midship hold will be worked *with four hydraulic cranes*. Accommodation is arranged for 61 first class and 48 third class passengers. The owner of the CONDAD DEL SOL is the Argentine Navigation Company. Machinery consists of two Harland-B. & W. Diesels.

The Brooklyn Polytechnic Institute will start the evening course for Diesel engines for the fifth year. This course has proved to be very popular during the previous four years, and it is expected that full attendance will mark its opening on Tuesday, September 25th. It will consist, as in past years, of 20 two-hour exercises held every Tuesday evening from 7:30 to 9:30 P. M. E. J. Kates, who gave the course last year, will again be the lecturer.



German-built yacht, Coronet, owned by Irving T. Bush of New York, and powered with 800 *hp. Krupp Diesel. Designed by Cox & Stevens*

Among the construction under way at the Collingwood Shipyards, Limited, Collingwood, Ont., is a steel twin-screw Diesel-engined scow —with propellers working in tunnels—for River work at Sanamaur, Quebec. The scow is being built for the Brown Corporation, Quebec and is 50 feet long, 12 feet wide by 4 feet deep and is intended for river service.

The U. S. Public Health Service has placed a contract with the Wheeler Shipyard, Brooklyn, N. Y., for a 50 ft. boarding boat and ordered a four-cylinder 8½ in. by 12 in. direct reversing 100 hp. Standard Diesel engine for installation. Four other boarding boats for this Government Department have previously been powered with Standard Diesel engines.

On this page is given an illustration of the new Diesel yacht CORONET, built and engined at Krupps yard, Kiel, Germany, to the order of Irving T. Bush of New York. Designed by Cox & Stevens, the CORONET is a handsome vessel of the clipper-bow type, reminiscent of the steam yachts of former days. Of steel construction, she is 186 ft. long by 27 ft. breadth and 10 ft. 6 in. draft. Two 800 s.hp. Krupp airless-injection Diesel engines drive her at 12 knots. Fuel and water stores are carried for 7,000 miles cruise. In addition to the saloon, dining room and library, there are six state rooms each with a private bath, as well as quarters for officers and crew.

Three motorships building for the Gulf Refining Co. of Pittsburgh, Pa. at the Furness Shipyard in England, have M. A. N. airless-injection auxiliary Diesel engines.

Through the development of the preformed type of wire rope, making possible the attachment of fittings by the processing method of compelling the fitting to become an integral part of the rope, the American Cable Company has recently perfected a flexible bolt. These new bolts may be used in countless places in and around ships and boats or in any place where rigid U bolts are impracticable. The principle on which the new flexible bolt rests is the preformed type of wire rope. Performing the wires and strands to the exact helical shape they must assume in the completed rope results in a cable that does not require seizing but may be cut like a rod. This type of rope permits a close fitting attachment to be slipped over the unseized end of the rope, and to be processed so that the steel of the fitting cold flows into the interstices of the rope and becomes practically an integral part. Naturally, such fittings can be threaded for a nut or capped for a head. The flexible bolt resulting from these developments is available in varying lengths, and holds promise for universal acceptance.

"Very keen competition has developed and we are faced with a necessity of keeping abreast with our competitors or sacrificing our good will. The four new Diesel motorships we have just ordered for the Prince Line North-South America service will be of 16-knot speed and 9000 tons d.w.c."—*Sir Frederick Lewis.*

PALATIA, PATRICIA, PHRYGIA and PHOENICIA, are the names of four new Hamburg-American Line 6,100 tons capacity motorships for the Europe-West Indies-South America service. The first two have 3,150 s.hp. M. A. N. double-acting Diesels and the other two have Sulzer single-acting Diesels.

The Second National Fuels Meeting is scheduled to convene at Cleveland, September 17-20, of this year. The Program Committee announces indications of a "splendid spirit of cooperation; remarkably close resemblance to a complete job" and, in fact, enthusiasm is not lacking. But a review of the advance program reveals what MOTORSHIP considers to be a serious omission. Not one of the 31 papers, thus far scheduled, will deal with the fuel economy characteristic of oil engines. The three marine papers will discuss pulverized coal firing, stoker firing and oil firing of the marine boiler. There is no gainsaying the fact that the program cannot be complete so long as the Diesel engine is not mentioned. This more especially in view of the fact that steam and fuel are not synonymous.

The German Government has ordered a set of Diesels developing 70,000 b.hp. on four shafts, said Dr. Wm. Sholz, managing director of the Deutsche Werft, Hamburg, when in San Francisco recently. Dr. Sholz spent some weeks at the plant of the General Electric Company, Schenectady, N. Y., investigating Diesel-electric drive for large vessels. The shipyard of which Dr. Sholz is the head is a subsidiary of the Hamburg-American Line.

Centrifuges Pay for Themselves in 30 Days

During Test of Shipping Board Engine Exceptional Economy Is Attained

DIFFICULTIES encountered while making test runs and adjustments of Diesels on factory test may be taken more or less as a matter of course. After an engine has been placed in service the cause of any delay in operation or involuntary shutdowns may be very accurately checked by referring to the log. If the engine manufacturers could make a similar thorough analysis of the various reasons for delay in execution of test runs, the aggregate time lost as the result of foreign substances entrained in the fuel and lubricating oil not being removed before going to the engine would no doubt give food for serious thought. The truth of the foregoing statement is amply verified in the following detailed account of the operation of centrifuges in connection with a 30-day test run of one of the large Shipping Board engines now in service at sea as the main propelling unit of one of the Board's converted ships.

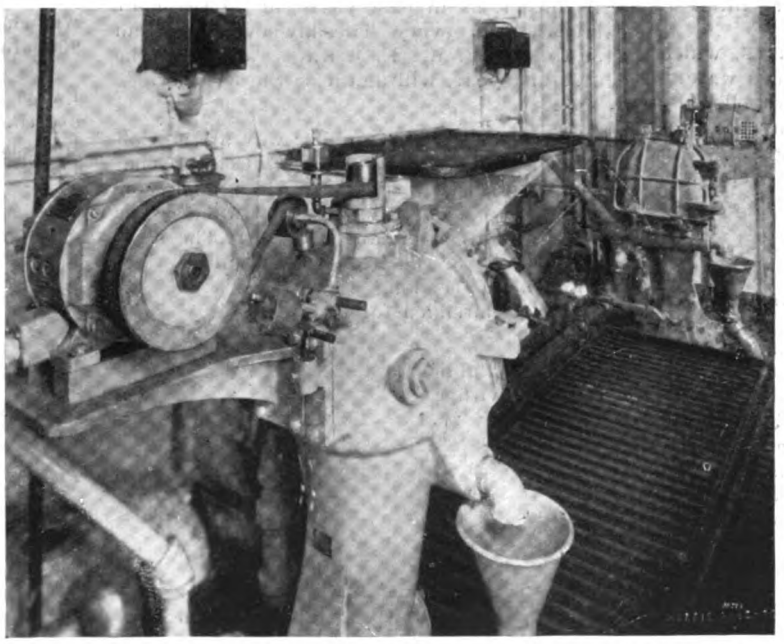
The man responsible for test operation of a Diesel engine never feels safe until after a sufficient amount of oil has passed through the various parts of the system to completely purge it of dirt. Thereafter he feels somewhat safer; but his worries do not end until a positive method of eliminating possible impurities delivered with the oil is provided. Even then the possibility of dislodgement of dirt in the system, between the centrifuge and the point of oil or fuel application exists because no matter how carefully an engine is cleaned, prior to starting up, a certain amount of abrasive substance still remains. Mill-scale, rust and core-sand are the most common trouble makers, on new jobs. Although we have no definite report on this subject, we feel safe in stating that more instances of overheated bearings, scored piston rods, damaged cylinder walls and rings, more damaged fuel pump valves and fuel pump plungers and more deranged atomization are chargeable to impurities in the fuel and lubricating oils used on test runs than are chargeable to poor workmanship or incorrect adjustment of the engine prior to making the first start.

The Diesel owner may mistakenly attempt to save the "insurance premium" of centrifugal equipment for fuel and lubricating oil purification, feeling that service interruption and trouble due to fuel and lubricating oil will average in with other irregularities in operation to give a fairly satisfactory showing of continuity and efficiency of operation. The manufacturer, faced with the stringent requirements of a thirty day test, allowed but a few hours' interruption and subject to penalties and even rejection of the engine in case of failure to meet the test requirements, can overlook no safeguard that will help assure success.

Operation of the engine in question, before starting the thirty day test, proved that even the purchase of high grade Diesel fuel would not give the necessary assurance of uninterrupted operation. The several strainers placed in the fuel oil lines were found inadequate to protect the atomizers, fuel valves and pumps. To avoid interruption of the fuel supply it was found necessary continually to watch the strainers and to remove from them accumulated solids. Impurities passing through the strainers plugged the atomizers at too frequent intervals. The delicately adjusted fuel pumps, upon the proper functioning of whose by-pass arrangement depended the whole load control of the engine, were also seriously hampered in operation by unremoved solid substances.

Installation of Centrifuges for Fuel Oil

Two large oil storage tanks were provided to receive the oil delivered from tank cars. The fuel was then pumped as required, to a 700 gallon tank supplying two centrifuges. The oil in the supply tank was heated by a steam coil to the proper temperature for centrifugation. This averaged 144°F. during the test.



For the useful work done, a centrifuge occupies very little space

For the first twenty-four days of the test, the centrifuges were operated alternately. One was run for forty minutes out of each hour and then shut down to allow the clarified fuel to be weighed and discharged from the weighing tank to the engine supply tank. Operation was then resumed with the other machine and the bowl of the first one cleaned and reassembled. During the last days of the test, one machine was run continuously for three hours before shut down for cleaning, although the oil was shut off at forty minute intervals to permit weighing and discharging clarified fuel oil from the weighing tank.

It is noteworthy that only three times did the oil contain water, evidenced by drainage from the bowls of the machines when stopped. At least part of this water came from leaks in the coils used to heat the tanks cars. Such a small amount of water is, of course, not normal except on land installations. To this extent the full benefit to be derived from fuel oil purifiers on shipboard was not demonstrated. Fuel carried in double-bottoms is subjected to water contamination through leakage of the hull and condensation of moisture in the air.

The fuel oil used in this test had values determined by analysis of samples from each tank car as follows:

Fuel Oil Characteristics

	Maximum	Minimum
Specific Gravity, °Be.	24.1	26.7
Flash Point, °F.	263	217
Visc. Saybolt Furol @77°F. sec.	107	28
Moisture and Carbon, p. c...	0.44	0.09
Sulphur, p. c.	0.55	0.40
Heat Value, B.T.U.	18,989	18,810

Fourteen hundred and seventy-eight pounds of solid material was removed from the bowls of the centrifuges during the test, an average of almost fifty pounds per day.

All of the constituents removed excepting the oil, are calculated to interfere with proper economical engine operation. Analysis clearly indicates that protection is given to cylinder liners, pistons, atomizers, fuel pumps and valves by centrifugal purification over a relatively short operating period. We find that 141,621 gallons were centrifuged, or at an hourly rate of 298 gal. per hour, for the time that the centrifuges were in operation. At the end of the run, examination of fuel valves, fuel pumps, atomizers and strainers revealed that the centrifuges had effectively removed abrasives and lint from the fuel. Cylinder liners and pistons were also observed to be in excellent condition.

Oil used was of an inferior quality and lower price than the oil used for "running in" the engine before the test. Then so many indications of trouble had developed that it was decided to install the centrifugal equipment for the test proper. The price differential between these oils is calculated as being sufficient to return approximately

(*Continued on page* 771)

the original price of the centrifuges during the thirty day test. When it is considered that this test is equivalent to almost 10,000 miles of operation, or three trips across the Atlantic, it is evident how rapidly centrifugal equipment can be made to pay for itself in the single item of fuel costs alone.

Analysis of the sludge and the weight of the separate constituents, included in the total weight of sludge follow:

Constituents		Total Weight Removed
Water	27.20%	402 lbs.
Oil (Petroleum Ether Extract)	41.14%	608 lbs.
Asphaltenes (Carbon Bisulphide Extract)	13.17%	195 lbs.
Carbon, Fibre, etc. (Combustible Residue)	9.08%	134 lbs.
Ash (Non-Combustible Residue)	9.41%	139 lbs.
Totals	100.00%	1478 lbs.

The only repairs to the centrifuge were negligible, consisting of the replacement of six rubber couplings, most of which failed, due to the inexperience of new operators in the operation of the machine.

Lubricating Oil Purification

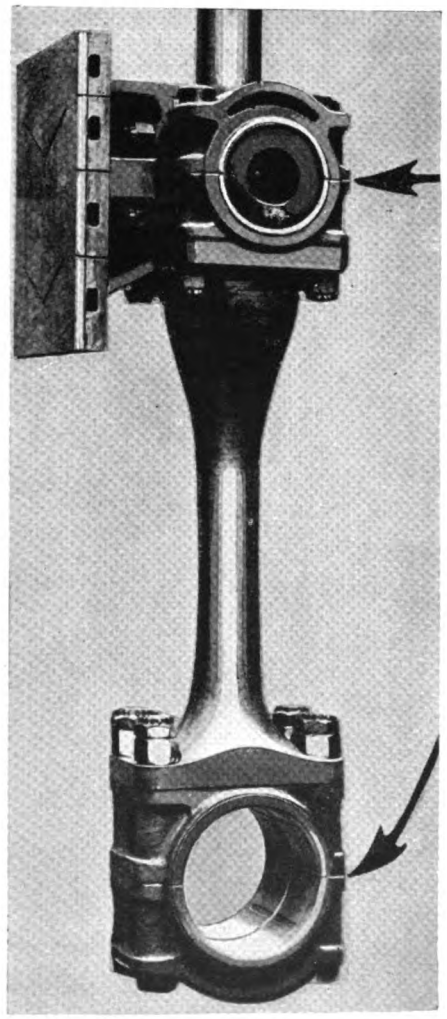
The lubricating oil cycle, as arranged for the test, was as follows: Oil in the force feed lubricating system drained from the lubricated points into the oil pan of the engine from which it flowed by gravity to a sump tank at a temperature of 100 to 120°F. From this sump tank it was picked up by a pump, passed through two strainers in parallel, then through two coolers in parallel, from which coolers it passed at a temperature of 85 to 100°F. to the engine bearings, and other lubricated parts. A total of 1000 gallons of oil was carried in the lubricating oil system. Circulation through the system was sufficiently rapid to move the whole quantity of oil six times per hour. The lubricating oil purifier was supplied with the oil from the discharge side of the pump and discharged water to waste and purified lubricating oil back to the sump tank. The capacity of the centrifuge was sufficient to purify the total oil in the system once every five to six hours.

When the engine was shut down temporarily at the end of twenty-one days, the oil was drained from the engine oil pan to remove a bad emulsion caused by an excessive leak of cooling water, this emulsion would not flow from the pan by gravity to the sump tank, and therefore was not being taken care of by the centrifuge. An entire charge of fresh oil was placed in the lubricating system and when operation was resumed the centrifuge was used one hour for purification of oil in the engine system, and one hour to treat the removed emulsion, the recovered oil being stored in barrels after purification for subsequent use. At the time of the change of oil a heater was installed on the feed line leading to the centrifuge, so that the oil could be brought to a temperature of about 180°F. for separation.

Through the courtesy of the Sharples Specialty Company we have been enabled to publish the actual results of this 30-day period of centrifuge operation. Unfortunately we have been unable to procure a similar report of actual operation at sea. It is extremely difficult to obtain reliable data, taken on shipboard, on substances removed from fuel and lubricating oil.

Eliminating Error in Bearing Adjustment

CONSIDERABLE improvement in the maintenance of bearings, particularly those of large diameter, has been effected by the use of laminated or multi-leaf shims consisting of paper-thin brass leaves sweated together by means of solder under heavy hydraulic pressure. Shims of this kind compare favorably with those of the loose-leaf type, for the reasons mentioned below.



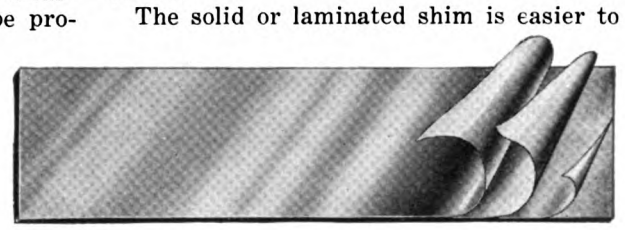
Correct adjustment of these bearings is essential

For many years shims in the form of laminations of different thicknesses were made up in pads and clamped between the bearing halves by hauling home the bolts. When adjustments were made it was necessary to remove the pad and pick out shims of the correct thickness to reduce the clearance to the right amount. Since adjustment in steps of 0.005 in. are frequently too great to permit obtaining correct bearing clearances, it follows that shims must be provided with a difference in thickness of 0.002 in. or 0.003 in. in order to make correct adjustment. This method would involve removal of a shim of 0.007 in. and replacement with one of 0.005 in. to reduce the clearance 0.002 in.

This seems like a comparatively simple procedure until we take into account the fact that a stock of cut shims must be kept on hand if adjustments are to be made without delay, unless they are of laminated type. Every engineer who has used this method knows that he must retain a stock of spare shims for every different bearing in the engine and that spare shims have the perverse habit of eventually becoming all of one or two thicknesses, never or seldom to the amount required when adjustments are made. To compensate for this provoking state of affairs, shim stock of different thicknesses is carried on hand. When shims of the correct thickness cannot be found in the stock on hand, new ones are made. This requires time. Sometimes, for lack of shim stock an attempt is made to file the box just enough to permit the use of a shim that is already cut to shape; and filing is not always accurate.

The laminated shim is to all intents and purposes a rigid block, better fitted to withstand the pounding and shocks often unavoidable in the operation of all internal combustion engines. Sweating the leaves together permits thinner brass to be used than is the case when they are loosely laid together, hence finer adjustments are possible, less care and skill on the part of the operator are required, and the liability to crumpling and damage, also the possibility to having a bearing damaged by operating with a wrinkled shim leaf is practically eliminated. Peeling the shims is readily effected by means of a penknife and as the thickness is standard, measuring by means of a micrometer is obviated to a larger extent.

The solid or laminated shim is easier to adjust close to the shaft with a view of minimizing oil leakage. Shims are doweled by means of pins let into the faces of the bearing halves for the double purpose of preventing their being displaced at assembly and of holding the inner edges as close to the shaft or pin surface as possible; the latter practice reduces the gap through which the oil can escape. The laminated shim, being a solid substantial block, may be doweled much closer to the shaft surface and hence permits of lighter lubricating oil seal than do the looseleaf combinations.



To reduce the thickness of Laminum shims thin layers are peeled off

It is possible, also, to provide the laminated shim-block with babbit inserts for working against the surface of the journal. The babbitt may be scraped on its vertical edge to fit the shaft surface in the same way as the babbitt of the bearing shells and further reduce oil leakage.

Progress in the Art of Stabilization

A Comprehensive Outline of Achievement by Sperry in Preventing the Roll of Ships

IN THREE PARTS—PART II

(Continued from August Issue)

By R. W. Crowly

Accomplishments.

WHAT has been done in the last decade by Sperry to demonstrate the successful solution of the problem of stabilization must not be ignored by merchant shipowners merely because it has been in the yachting and naval domains. Owners of large power yachts seeking relaxation afloat are naturally more prone than any other group in marine circles to try out such an innovation, for they view it in terms of comfort and pleasure, which are the goals of their pursuit. To navies there is the special inducement of a controlled gun platform or stable landing deck for airplanes.

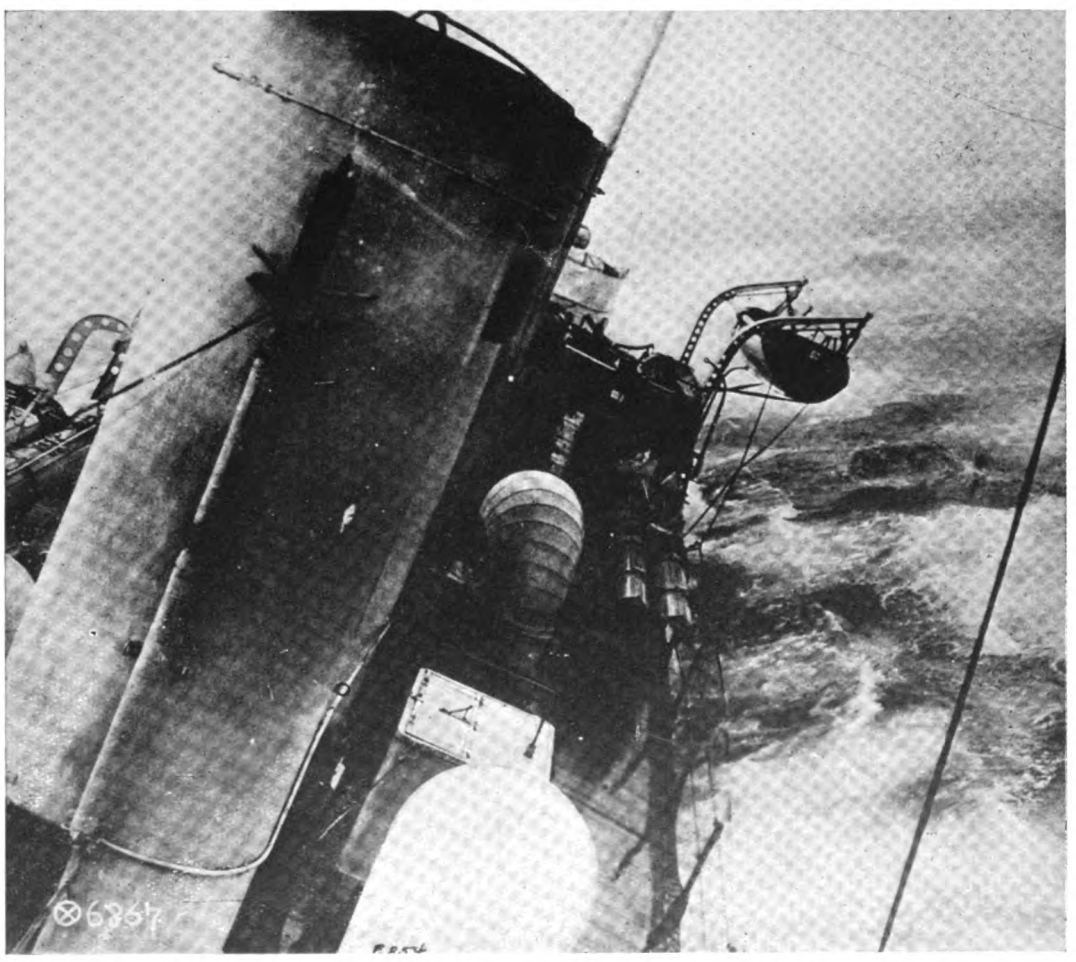
Among the stabilized vessels that have contributed to the modern development a representative number will be cited.

1. WIDGEON, a steam yacht of 165 tons displacement, was the first stabilized boat in this country—omitting from the count a purely experimental installation of a temporary character and steam operated on the U. S. destroyer WORDEN in 1913. In 1915, H. M. Hanna, Jr., had the WIDGEON equipped with a Sperry stabilizer which was electrically operated, as all others since that date have been. It was entirely successful and gave complete satisfaction for 10 years, until the boat was lost by fire.

2. WHILEAWAY, the 480 tons displacement steam yacht built for Harry Payne Whitney in 1915, was equipped with a stabilizer when she was built. In this boat was first encountered that passing phase of development where stabilizer installations were handicapped by a chronic shortage of electric power. This occurred in several boats, and though yachts are still almost without exception short of electric power for auxiliary purposes, the Sperry company now makes sure that the small requirements of its apparatus can be taken care of. When the owner of the WHILEAWAY ordered a larger generating auxiliary this impediment was overcome, and the stabilizer has been in successful service ever since.

3. About the same time the CAPTIVA, a motor houseboat of 250 tons displacement which Payne Whitney had ordered, was fitted with a stabilizer. In every respect this also proved a thorough success from the start and has so continued ever since, a period of more than 10 years.

4. ARAMIS, a 290 ton motor yacht completed for A. H. Marks early in 1917, showed the same deficiency as the WHILEAWAY in her first period. The stabilizer needed a maximum of only 12 hp. for continuous operation, but only 12 hp. was available for the entire auxiliary service of the boat and that caused serious inconvenience when power was needed for the stabilizer. Having superintended the completion of this boat I am familiar with the details. The stabilizer had been ordered later than the power plant, but no provision had been made for the small extra load. During the stabilizer trials we were short of power to get the stabilizer fully into action, but nevertheless the apparatus was able to keep our rolling within an arc of 4 or 5 degrees, contrasted with the rolling of 30 and 35 degrees registered when the stabilizer was off. Before the owner was able to use the boat, she was taken over by the Navy Department, and her displacement was subsequently increased to about 450 tons, an increase of more than 50 per cent over the original design and demanding therefore a stabilizer of correspondingly higher capacity.

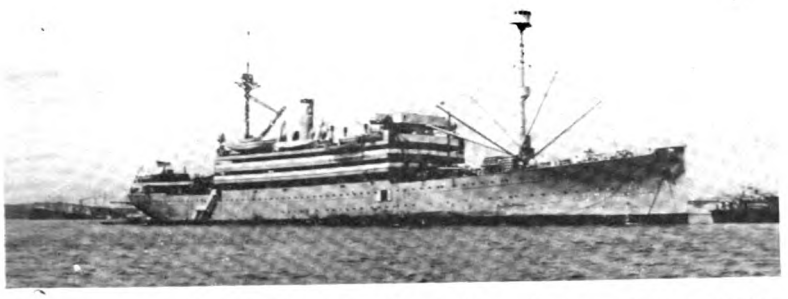


A destroyer in rough weather at sea is a rough-riding ship. About 40 degrees roll is in evidence. Stabilization would prevent it

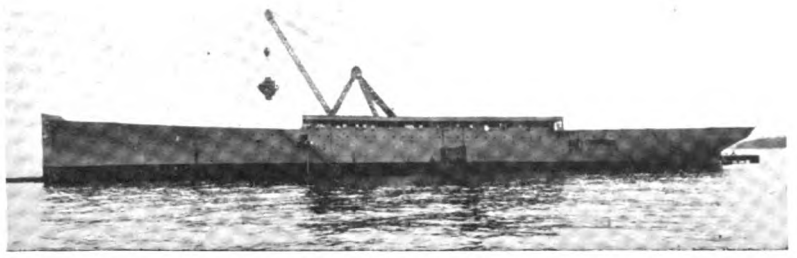
5. About that date the stabilizer for the U. S. S. HENDERSON, a 10,000 ton naval transport, was completed, but the advent of the war delayed its installation and not until 1919 was it actually put into the ship and given a trial. During the building of the vessel many changes were made from the original design, markedly altering her rolling characteristics. The stabilizer having been ordered to meet the conditions of the original design is not now well suited to the ship and therefore cannot completely suppress the roll. During special trials made to determine the ability of the apparatus first to steady the ship and secondly to roll the ship for gunfire control the records were quite impressive.

6. In the case of the LYNDONIA, built in 1920 as a steam yacht of 1150 tons displacement for Cyrus H. K. Curtis, the decision to install a stabilizer was not reached until after she had been completed, and the only space that could be found for it then was in the deckhouse. There it remained until 1925, when it was transferred below at the time the yacht was being converted from steam to oil engine power. The owner relies so much on the stabilizer that since it was installed he has made a three to four months' cruise each winter, whereas formerly he did no extensive cruising.

7. On the Pacific Coast there was made in 1923 what has proved to be one of the most instructive stabilizer installations yet made. A Seattle naval architect, E. D. Scheel, in that year converted a 110 ft. submarine chaser into a charter yacht, the TENINO. One year later when the guarantee period expired, he wrote: "The stabilizer has more than lived up to your guarantee. We have encountered some very heavy weather off Cape Flattery as well as on other occasions in the Straits; the stabilizer always was on the job and resisted practically all the roll in beam seas as well as following quartering seas. I have found that the latter have always caused more violent roll without the stabilizer than seas from beam or other direction. . . . The successful operation of this stabilizer on numerous voyages has gone far to demonstrate the practicability of the art to many of my friends here who were loud in their



Stabilizer was installed in 10,000*-ton Army Transport* HENDERSON *nine years ago, but subsequent change in ship design prevented complete stabilization*



Japanese airplane carrier Hosho having stabilizer installed in 1922. *Note size of complete stabilizer unit suspended from the derrick compared to size of ship*

skepticism. . . . Outside of starting and stopping, adding some oil occasionally and keeping it clean, the stabilizer has given less trouble than any other piece of machinery aboard the vessel during the many times it has been in operation throughout the past year. . . ." TENINO'S displacement is about 120 tons and the stabilizer is fastened to the wood frames by 36 three-eighth inch lag screws. This bed and the mode of fastening afford a good demonstration of the error of the widespread misconception that a stabilizer introduces serious stresses.

8. In 1923 the British Navy made its first trial with a Sperry stabilizer, using for the purpose the destroyer VIVIEN of over 1200 tons displacement. A comparison of the rolling of this destroyer in the free and stabilized conditions respectively can be seen in the graphic record reproduced on this page. There one can observe how the rolling to a maximum arc of 40 degrees, more or less, every two minutes or so without the stabilizer in action was almost entirely suppressed when the stabilizer was cut in, the average roll then being three degrees with a maximum of five degrees. To obtain a comprehension of the effect of rolling through an arc of 40 degrees one should study the picture of the destroyer on page ??, heeled over to an angle of 31 degrees, which corresponds to a roll of 62 degrees. To stand without bracing on the deck of a boat rolling through only 40 degrees is a dangerous accomplishment and to many people is impossible. Graphic records of the effects of the stabilizer are available for all the vessels here mentioned, but the British Admiralty record has been chosen for illustration because of its clearness and because of its foreign origin.

9. A Japanese Navy test of 1924 is very impressive. It was made on a considerably larger vessel and is thus more instructive to merchant shipowners. With that progressiveness which is such a marked feature of all Japanese activities, the Imperial Navy of that country seems to have perceived the benefit of a stabilized airplane carrier earlier than others and in 1922 equipped the HOSHO, a 10,000 ton airplane carrier, with a stabilizer. By the courtesy of the Imperial Japanese Navy Commission in the United States the following summary of a trial of the HOSHO at sea in heavy weather can be given: "The vessel rolled up to 40 degrees total arc when the stabilizer was held inactive. Within four oscillations after the stabilizer was released to quench the roll, the total roll of the vessel was reduced to four degrees total (or two degrees each side). This was accomplished with the stabilizer rotor running at only four-fifths normal speed. With the rotor running at full speed, 815 r.p.m., even those small rolls would have been further reduced." Little imagination is needed to understand the advantage of steadying an airplane carrier and providing a practically stable deck for the take off and landing of machines. One of the most important factors in airplane carrier design, perhaps rivaling the factors of size and speed, must surely be the stabilization of the landing deck.

10. In the Royal Italian Navy successful trials have bee made with the destroyer PEPE of 2000 tons displacement, and it is understood that stabilizers are called for in the specifications of two destroyer leaders and two cruisers. Moreover, it may be under the Italian flag that the first stabilized passenger liners will be seen. Italy has always been in the van of shipbuilding progress even when her annual shipbuilding returns have been low, and now that her merchant shipping is in the ascendant she is not missing the opportunity of demonstrating progress in a practical manner. More than one of the large Italian shipping companies is giving very earnest consideration to the suppression of rolling in the vessels.

11. Although the U. S. Navy has been cramped in its opportunities for development work since the war, due to the restriction of its building activities practically to a few capital ships laid down right after the war and to a few light cruisers in which speed—and therefore propulsion machinery—is the predominant factor, a research installation of a stabilizer was made in 1924 on the U. S. destroyer OSBORNE. A part of the armament had to be removed in order to make space for the stabilizer. Trials were conducted in 1924 and 1925, proving the efficacy and dependability of the apparatus and yielding the desired data for use at a later date when opportunity may allow, and the armament was then restored.

12. Paul D. Cravath, the eminent lawyer, who was a guest on Harrison Williams' yacht WARRIOR during a large part of that boat's round-the-world voyage last year, wrote after his return home: ". . . We all voted the gyro-stabilizer a great success. . . . The gyro-stabilizer was most effective in reducing rolling in heavy seas. . . ." WARRIOR is a motor yacht of 1800 tons displacement, built abroad in 1923, and since the installation of her stabilizer in 1924 has been the largest yacht yet stabilized.

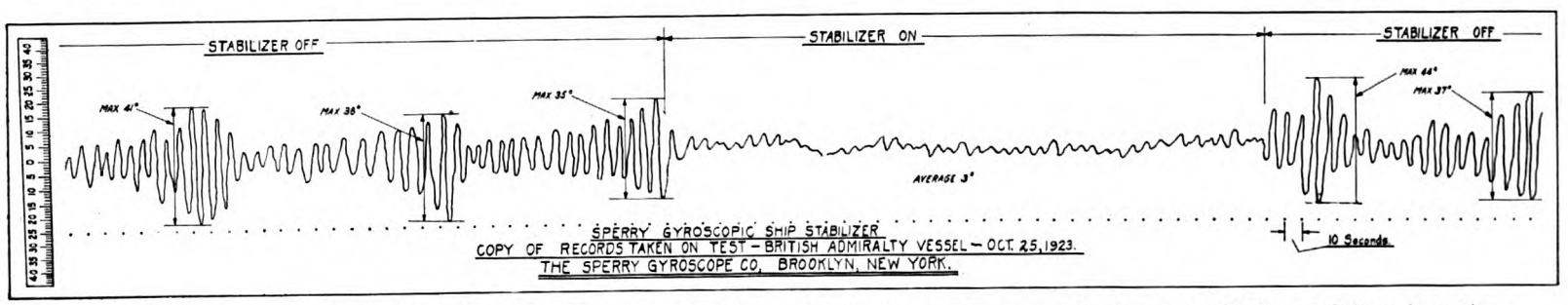
13. Colonel H. H. Rogers has the smallest stabilizer in his new electric fishing yacht FAN KWAI built last summer. The boat displaces 18 tons. In tests made last fall the rolling, which attained 20 degrees when the boat was free, was confined to two degrees when the stabilizer was put into action.

14. A stabilizer has been installed in the 2200 ton yacht SAVARONA delivered this year to Richard M. Cadwalader, Jr. She is the largest stabilized yacht.

Ranging in size from 18 tons to 10,000 tons, these vessels have afforded a variety of experience demonstrating the ability of the Sperry stabilizer to suppress rolling, and it has been achieved with apparatus weighing only between one and one-half per cent and two per cent of the vessel displacement and demanding extremely little power. This statement, I am conscious, is an endorsement that many will regard as premature and that others will regard as exaggerated, but I have looked on this subject at intervals for 20 years, my early misgivings about the stresses encountered were dissipated as soon as I got to close grips with the subject, and I have long waited to present the confirmation of experience.

Diesel Versus Steam

Comparison tests are now being made by three ships—two steam and one Diesel—just placed in service by the Ellerman Lines of Liverpool. One of these vessels has quadruple expansion reciprocating steam engines, another single reduction geared turbines and the third Doxford-type opposed-piston Diesel engines. These vessels are of 10,300 tons d.w. capacity, 445 ft. length b.hp., 57 ft. 9 in. molded breadth and 33 ft. 11 in. depth. In our opinion the best comparison results could have been obtained by designing the two steamships of the same size as each other, with a given net-cargo capacity (not deadweight) and a given speed.



Note the manner in which the roll gradually builds up without stabilization and how quickly it stops with the stabilizer in action

Increasing Speed One Knot by Exhaust-Turbo Charging

Adding 30 Per Cent Power Without Increasing Cylinder Dimensions or R. P. M.

AN important innovation which may more than equal recent progress in high pressure superheated steam, mercury boilers, and turbo-electric drive, is now being carried out in England on a motorship that has just completed three and a half years of excellent service. It consists of a recent adaption of Buchi exhaust-turbo charging to her Diesel engines, which —while far from costly—is expected to increase the power by 30 per cent and the ship's speed by one knot. But neither the bore, stroke nor revolutions will be increased.

The vessel is the motorship RABY CASTLE owned by James Chambers & Company, Liverpool, who have been operating her since April, 1925, in their New York and Far East service. This vessel has a deadweight capacity of about 8,000 tons with 11 knots speed. The main propelling unit is an 8-cylinder, 28¾" x 51-3/16", four-cycle North Eastern Werkspoor Diesel, which develops 3000 indicated horsepower, or 2175 s.hp., at 92 R.p.m. On trials three year ago 11.9 knots was averaged at 92½ R.p.m. and 10.9 knots at 85¾ R.p.m. Fuel consumption averaged 0.404 lbs. per s.hp. hr.

Through the courtesy of the owners, a trial trip was to have been run off Tyne immediately upon the vessel's arrival and before conversion, which was intended to give interested parties an opportunity of obtaining data during normal operation of the engine. But a recent fire in the hold prevented this. So for comparison with the result of the trial trip upon completion of the conversion, service figures will have to suffice.

Concerning this system of increasing the power of the four-cycle Diesel engine without increasing the bore and stock, Dr. Stodola has rendered a very interesting report. His conclusions were based upon tests carried out in December, 1927, on a 1000 b.hp. Diesel working on the Buchi system. They are that this system increases the normal power output of an ordinary four-cycle engine by 50 per cent and the maximum output by 100 per cent. Temperatures of combustion and of the exhaust gases are the same or even lower than in the ordinary Diesel engine. Fuel consumption per b.hp. hour is lower and less heat is carried away in the cooling water. This system should not be confused with normal supercharging in which air is pre-compressed by means of electrically or steam driven blowers before entering the Diesel cylinder.

Tests have demonstrated that by this means about double the weight of air as compared with the ordinary engine is in the cylinder at the start of the compression stroke. At the start of combustion this air is at a lower temperature than in the ordinary Diesel engine. The increased quantity of air permits about 40 per cent more fuel to be injected and burned. Temperatures are lower throughout the cycle. Heat stresses in the cylinder parts are no greater because of the fact that pressures and temperatures remain normal. An essential difference between the exhaust turbo charging system and ordinary supercharging is that in the latter, power to operate the blowers must be obtained by the installation of additional auxiliary engines, generators and motors. These would have a power equal to a quarter or a third of the power of the main engine. The ultimate saving in the cost of operation would be governed by the additional power required.

The RABY CASTLE is an excellent vessel upon which to demonstrate this improved method of obtaining power. Her actual sea performance extending over a period of three and a half years is well worthy of the attention of prospective motorship purchasers. Her owners have permitted us to present some very interesting figures which will give an idea of how she has been performing. The table below presents results of representative voyages under good conditions, that from Savannah to Bremen being the vessel's maiden voyage, which was run at 85 per cent of full power, all subsequent voyages being at full power.

The following is a summary of report on Lloyd's Survey in New York in 1927:

Cylinders: Wall in good condition with excellent skin on working surface. Condition of heads good.

Pistons: In good condition.

Crossheads: The average condition remarkably good; no signs of loose metal or cracks in bearings.

Crankpins and Brasses: The wear on crankpins cannot be noticed, and certainly does not exceed 0.002 in. on any engine. All brasses in good condition. Average wear of brasses 0.005 in.

Main Bearings: Bridge gauge reading: Normal in eight bearings. Wear down in other two bearings is 0.001 in. and 0.005 in. respectively.

Compressor Main Bearings: Bridge gauge reading: normal. In all the main bearings it was not possible to remove any liners, but to effect the slight necessary adjustments the keeps were hardened up to suit. The journals have no appreciable wear—i.e., the difference between the working surface and the normal diameter cannot be detected.

Crankshaft (Unity Type): All welding was soundly tested and found to be firm.

Bedplate Holding-down Bolts: Two bolts near after end were found to have slacked back slightly, but all the others were quite in order.

Engine Seating: Hammer tested and found to be sound.

Auxiliary Engines: Nos. 1 and 3 were completely dismantled and passed by Lloyd's. Everything in good condition. All gearing in connection with the vertical camshaft drive is in perfect order, the teeth showing very little wear. All hold-down bolts and seat rivets hammer tested and found sound.

The careful manner in which the owners have checked over the condition of the machinery is a commendable procedure. With the data they have on hand it will be a simple matter to check the increased power output of the engine following conversion, and actually prove the results gained.

Thus they will prove to their own satisfaction the actual effect upon the general physical condition of the engine resulting from this change. MOTORSHIP will give details following conversion.

Representative Voyages of M. S. Raby Castle

Voyage	From	Savannah	New York
	To	Bremen	Manila
Date	Leaving	May 22, 1925	Nov. 28, 1926
	Arrival	June 8, 1925	Jan. 13, 1927
Mean Draught		24' 8"	23' 2⅝"
Displacement (Tons)		11,250	10,530
Distance (Nautical Miles)		4,104	11,440
Time, Days (Hrs., Mins.)		15 : 22 : 20	41 : 5 :14
Speed (Knots)		10.75	11.564
R.P.M.		84.8	90
Slip (%)		5.0	3.65
I.H.P.		2,419	2,830
Total Fuel Main Engines (Tons)		113.9	391.57
Total Fuel Main Engines per day (Tons)		7.15	9.5
Fuel/I.H.P. Hr. (Lbs.)		.279	.31
Total Fuel, all purposes (Tons)		120.72	410.29
Total Fuel, all purposes per day (Tons)		7.55	9.754
Total Cylinder Oil (Gals.)		147	256
Total Cylinder Oil per day (Gals.)		9.25	6.21
Total Compressor Oil (Gals.)		7.96	14
Total Compressor Oil per day (Gals.)		.5	.34
Total Crank Case Oil (Gals.)		67.7	50
Total Crank Case Oil per day (Gals.)		4.25	1.21
Total Lub. Oil, all purposes (Gals.)		222.66	320
Total Lub. Oil, all purposes per day (Gals.)		14	7.76

Diesel Engines for Naval Vessels

A Review and Analysis of Factors Governing the Installation of Diesel Power in Naval Craft

By A. M. Proctor, Captain, Ret'd, U. S. Navy

THE military mind has always been a conservative one. Its history abounds in examples where a generation with just pride in its part in the development of the existing order, has resisted the introduction of new ideas.

In the first edition of J. Fenimore Cooper's history of the Navy, published in 1839, there is an introduction reputed to have been written by a distinguished British naval officer, who quotes the following: "There is an opinion becoming prevalent that the use of steam will supersede the old method of conducting naval warfare. Like most novel and bold propositions, this new doctrine has obtained advocates who have yielded their convictions to the influence of their imagination rather than to the influence of reflection."

In a study of the past we have found courage to advance the ideas set forth later in this article, in spite of the opinion of one of the greatest authorities in the field of steam engineering that it is an absolute impossibility to use them (Diesel engines) for such powers as those of our light cruisers.

I am attempting to justify the belief that the Diesel engine, with its many admitted advantages over the most modern of steam plants, is practical for all classes of naval vessels. In view of the fact that the opinions here stated are a development through continued study of the ideas I expressed in an article in the *Proceedings of the Naval Institute* for July, 1925, it is appropriate to turn back and outline briefly some of the developments from that time up to the present.

In that article it was stated: "There is much evidence now available that the Diesel engine has arrived at a point where it is possible to consider it seriously for capital ship installations," and that, "with the present state of knowledge, the design and development of a suitable engine does not present insuperable difficulties."

The engine suggested at that time was one having a cylinder diameter of 34 in. with a normal rating of 1560 b.hp. per cylinder, and an overload rating of 2600 b.hp. at 1225 ft. per minute piston speed. The weight of this engine was estimated at 5 lbs. per cu. in. cylinder volume, would give a weight per b.hp. of 63 lb. at overload rating and 105 lbs. for normal rating.

In commenting upon this proposal a very high authority stated: "It is my personal and official opinion that enduring progress is made by steps rather than by jumps. It is wiser to make improvements than to attempt a possible but improbable miracle."

Diesel Development Progressing Rapidly

Yet we have today (1928) two engines which at normal rating show a materially higher output than the engine then proposed, and we now know that these engines were under construction at the time the foregoing was written. The Fiat double-acting Diesel engine with a cylinder diameter of 33.1 in. and a stroke of 39.4 in. develops 2000 b.hp. at 150 r.p.m. with 984 ft. piston speed. This engine has attached air compressor and scavenging pump. With these independently driven the power developed will be 2400 b.hp. The weight per b.hp. is 109 lbs. At 1200 ft. piston speed the power will be about 3100 b.hp. The weight will be 70 lbs. per b.hp.

The Sulzer double-acting Diesel engine with a cylinder diameter of 35.5 in. and a stroke of 55.13 in. has developed 2800 b.hp. at over load rating supercharged to about 120 lbs. mean indicated pressure, and 1000 ft. piston speed. With independent air compressor and scavenging pump this would be increased to about 3450 b.hp. Particulars of the Sulzer engine are not available, but it is interesting and significant that airless-injection has been used on the bottom of the cylinders, where conditions are more difficult than on the top. The mean indicated pressure was 103 lbs. per sq. in.

FOR its newest battlecruiser the German Admiralty is having built eight M.A.N. Diesel engines on four propeller shafts, aggregating—

70,000 Shaft Horsepower

Meanwhile the United States Navy Department does nothing but construct a few submarine-type Diesel engines of German wartime basic design in its own yards, and which should be built in some of our private Diesel plants. Why is our Navy Department so singularly backward in high-powered Diesel engines for war vessels? —*Editor.*

During the month of November, 1927, the subject of the motive power for a 60,000 ton transatlantic liner was under discussion in the press. It had been stated that this vessel had been planned for Diesel engines.

At this time the superintending engineer of a large steamship company, on leaving New York, is reported by the *New York Times* to have stated: "What engineer could construct engines of this power to drive a 60,000-ton vessel at 25 knots through the water?" And yet, in February, 1925, before the Institute of Engineers and ship builders in Scotland, H. H. Blache, whose first motorship has done over 750,000 miles* in fifteen years, stated that his firm was prepared to undertake the construction of a four-cyle, double-acting Diesel engine developing 2000 b.hp. per 43 in. cylinder. A few days after the above interview a very definite proposal came from Mr. Blache's firm for a four-shaft, 48 cylinder 120,000 s.hp. installation for a ship of the MAJESTIC class.

Weight an Important Factor

In considering the question of naval installation the most difficult problem is that of the light cruisers. The conditions are as follows:

Displacement	7500 tons
Speed	35 knots
Shaft horsepower	90,000 hp.
Propeller speed	380 r.p.m.
Weight available (1900 tons)	4,250,000 lbs.
Weight per s.hp.	47.3 pounds
Number of shafts	4 shafts

The conditions of this problem are established by the propellers. In order to obtain the power required with the limits of beam and draft the largest possible diameter has been used, with a very high speed of revolution. A propeller of 380 revolutions must be accepted as the minimum possible, with four screws. The draft limitation is such that a two-screw installation with a lower revolution speed is not practicable.

The first question to be decided is that of the weight available for the Diesel engine installation. This weight is that of the steam machinery, plus all auxiliaries, and fittings such as smokestacks, feed tanks, boiler water, additional fuel, condensers, piping and other accessories necessary to that installation.

Examination of sheets which have been published shows that the weight of the auxiliaries and fittings, necessary to a steam plant, over and above that of boilers, turbines and reduction gears, form a very considerable part of the total machinery weight. Remaining after these weights are removed are the ship's service auxiliaries, including the electric plant, the shafting and propellers, about one-quarter of the smokestacks and uptakes, stores, water, and a proper percentage of other miscellaneous fittings which will amount to about 35 per cent of the total machinery weight. An amount equal to the balance will be available for Diesel propulsive machinery and all necessary Diesel auxiliaries and will be about 2,766,400 lbs., equal to 30.7 lbs. per s.hp.

The conditions for full power of 90,000 s.hp. are abnormal. This is an overload condition the test for which is a four hour trial. For continuous steaming the power requirements are about 60 per cent of this, or 54,000 s.hp. On the basis of commercial practice, the latter figure is the controlling one.

In order to meet the abnormal figure of 90,000 s.hp., it is obviously necessary to install a high-speed engine, having the smallest possible specific weight consistent with rigidity, and the highest possible value for the mean indicated pressure, and having a small ratio of stroke to bore, and the highest practicable piston speed. The final result is the product of a number of factors, which for a two-cycle double-acting engine may be expressed by two simple basic formulae as follows:

$$\text{S.hp.} = \frac{\text{M.E.P.} \times \text{piston speed} \times \text{net cyl. area}}{33{,}000}$$

$$\text{Weight/s.hp.} = \frac{\text{Wt. per cu. cyl. vol.} \times \text{stroke inches} \times 33{,}000}{\text{M.E.P.} \times \text{piston speed}}$$

The various factors in the foregoing formulæ are all, in a measure, interdependent, but it is the values of the two variables m.e.p. and piston speed, which determine the final result. It is obvious that they must both be as high as possible.

What Is the Limit of Piston Speed?

A marine engineer would probably answer, "About one thousand feet per minute." Being naturally conservative, he would base his answer on his experience with reciprocating steam engines, before the days of forced lubrication, perfect balance, and nearly perfect rigidity of block cylinder construction.

* January, 1928.

If the same question were put to a Diesel engineer the answer would probably be, "We don't know; we are working forward all the time and only know that we are far from having reached the upper limit." Automotive engineers have reached a value of 4500 ft. per min. and while we realize that we cannot safely, in large engines, draw conclusions from small engines we do know that we will in the near future reach values heretofore considered impossible of attainment.

Bruno Nordberg, a designer of American heavy-duty engines has stated: "It is an open question as to what constitutes safe high piston speeds, and some of my early experiences have led me to adopt piston speeds over 950 ft., for heavy duty work, many years ago when 750 ft. per min. was considered very high. Today speeds of 1200 to 1400 ft. per min. are used, so that 1200 ft. per min. could be considered safe and feasible."

P. V. Schuh, in describing the new high-speed Augsburg, double-acting engine, states: "The work in this field of extremely high speeds has not been completed. They necessitate particular care in the selection of materials and in the design, considering that piston speeds are involved which are in the neighborhood of nine meters per second (1771 ft. per min.). Piston speeds of up to seven meters per second (1378 ft. per min.) have been used in service of late, and the scavenging of two stroke engines at such speeds is thoroughly satisfactory and insures perfect combustion."

H. H. Blache, managing-director of Burmeister & Wain, expressed his opinion by his actions in building engines of 1200 ft. piston speed. As a result of his experience with these engines he proposes a piston speed of 1500 ft. per min. for a larger double-acting four-cycle engine.

Allan Chorlton, designer of the Beardmore high-speed four-cycle single-acting Diesel engines, which have been remarkably successful when applied to rail car propulsion on the Canadian National Railroad, has adopted a normal piston speed of 1500 ft. with an over load rating of 1800 ft. per min. In the United States the Foos engine has been rated at 1600 ft. piston speed, and the 3000 s.hp. Trieber engine is designed to operate at the same speed.

Considering the evidence available, we are justified in assuming that, for 54 *per cent overload rating* for short periods required in naval engines, 1600 ft. per min. is not only possible, but also conservative.

The question then arises as to what value of the mean effective pressure is possible at this speed. The highest mean indicated pressure as yet obtained in a two-cycle engine is about 122 lbs. per sq. in. This was the Sulzer experimental air-injection engine, with about 7 lbs. per sq. in. scavenging air pressure. With this pressure there was undobtedly some supercharging. With airless injection this would be reduced some 15 per cent or to about 104 lbs. per sq. in. because the injection air supports combustion.

Advancement to High M. I. P.

In the Fiat air-injection engine 105 lbs. per sq. in. has been obtained, but it is by no means certain that this was the maximum possible.

With airless injection a mean indicated pressure of 120 lbs. per sq. in. has been obtained in a four-cycle engine. With a ratio of effective stroke to stroke of 0.75 this would give a mean indicated pressure of 90 lbs. per sq. in. in a two-cycle engine. With perfect scavenging driving all burned gases from the clearance space this would be increased by about 7 per cent, making the mean indicated pressure about 96 lbs. In the 35½ in. dia. Sulzer engine a m.i.p. of 103 lbs. has been developed with airless injection. Assuming an air compressor capacity of 15 per cent of the cylinder volume this would equal a pressure of 118 lbs. per sq. in. in an air-injection engine.

A fair assumption would be that with adequate pressure and capacity of the scavenging blower, a mean indicated pressure of 90 lbs. is possible; which, with a mechanical efficiency of 90 per cent (possible in a two-cycle double-acting engine with independent auxiliaries) would allow a value of brake m.e.p. of 80 lbs. per sq. in. without supercharging. With supercharging a mean indicated pressure of 100 lbs. per sq. in. is conservative.

It is obvious that with a four shaft arrangement a large number of cylinders will be required. The stroke of the engine is limited by the piston speed to 25 in. With a ratio of stroke to bore of 1.2, the cylinder diameter will be 21 in. The characteristics of the resultant cylinder will be as follows:

Cylinder diameter	21 in.
Net area	312 sq. in.
Shaft horsepower per cylinder	1250 hp.
Number of cylinders	72 cylinders
M.e.p. x piston speed	132,211
Stroke	25 in.
R.p.m.	380
Piston speed	1583 ft. min.
M.e.p.	81 lbs. per sq. in.
Mech. efficiency	90 per cent
M.i.p.	90 lbs. per sq. in.
Ratio stroke bore	1.19

The weight available for this installation is 30.7 lbs. per s.hp.

In order to determine the weight of the foregoing engine it is necessary, from an examination of the evidence, to determine the value of W—weight per cu. in. cyl. vol. in the formula for wt./s.hp.

Known Weights of a Number of Engines

Two-Cycle Double-Acting Engines

Engines	Wt. lbs. per cu. in. cyl. vol.
(1) Augsburg (H. O. R.) four cylinder 27.5 in. x 47.25 in. attached auxiliaries	7.7 lbs.
(2) Augsburg (Magdeburg) 6 cyl. 27.5 x 47.25 in. independent scavenge blower, engine including fly wheel air reservoirs, scavenge and exhaust pipes	6.45 lbs.
Independent scavenge blowers and motors	0.13 lbs.
Water and oil pumps	0.12 lbs.
Total for engine No. 2	6.70 lbs.
(The weight of this engine, in a new design, has been reduced to 4.2 lbs. per cu. in. cyl. vol)	
(3) Worthington four cylinder 26 in. x 42 in. attached auxiliaries	6.25 lbs.
(4) Augsburg high-speed airless injection 10 cyl. 23.5 in. x 35.6 in.	4.15 lbs.

Four-Cycle Single-Acting Crosshead Engines

(5) Worthington six cylinder 28 in. x 42 in. attached auxiliaries	4.20 lbs.

Four-Cycle Single-Acting Trunk Piston Engines

(6) Augsburg (submarine) 10 cyl. 21 in. x 21 in. attached auxiliaries	2.9 lbs.
(7) Beardmore-Chorlton trunk piston 8 cyl. 8.25 in. x 12 in. solid injection	0.72 lbs.

There are several deductions which can properly be drawn from an examination of the foregoing data. Engine number six was designed about 1914. It is built of cast steel and was, when built, considered a light engine. The air compressor will account for about 15 per cent of the weight. As an airless injection engine it would weight about 2.5 lbs. per cu. in. of cylinder volume. Engine number seven represents a more modern attempt at weight reduction, and shows an improvement with respect to weight of over 100 per cent. The other engines in this list are all commercial engines built of cast iron.

The possibilities of weight reduction, by the use of higher grade materials are very great. If the same proportion of weight saving as in the case of numbers six and seven, were applied to number five, a single-acting crosshead engine, the resultant weight per cubic inch of cylinder volume would be reduced to 2.10 lbs. Comparison of engines numbers three and five indicates that a two-cycle double-acting engine will weigh about 50 per cent more than a four-cycle single-acting engine. Applying this factor to the reduced weight of number five would give, for a two-cycle double-acting engine, with attached air compressor and scavenging blowers, a weight per cubic inch of cylinder volume of 3.15 lbs.

Engine number four is an airless-injection engine. The elimination of the air compressor accounts for some of its reduced weight. A refinement in design accounts for the balance, but this engine is a commercial engine built of cast iron for use on land. An examination of the schedule of weights of the Worthington engine as given by Dr. Lucke in the Transactions of the A. S. M. E., 1924, gives a clue to the possible weight reduction by the use of higher grade material. In this engine the major moving parts account for 20 per cent of the weight, and the remaining parts, which are largely of cast iron, account for 80 per cent. It is certain that the percentages for engine number four would not differ materially from the above. A conservative figure for the reduction in the cast parts by the use of cast steel in the place of cast iron, would be 30 per cent. This would reduce the total weight to about 75 per cent of that of a cast iron engine, which when applied to number four would bring that engine down to about 3.12 lbs. per cu. in. of cylinder volume.

A conservative value for a two-cycle double-acting engine, without the air compressors, scavenging pumps and oil and water pumps, would be 3.25 lbs. per cu. in. cylinder volume.

The weight per s.hp. for engines alone would be

$$\text{Wt./s.hp.} = \frac{3.25 \times 25 \times 33{,}000}{132{,}211} = 20.2 \text{ lbs}$$

This would leave a balance for Diesel auxiliaries of 10.5 lbs. per s.hp. a total of 945,000 lbs. The major weight involved would be for scavenging blowers, and this would be very large.

For normal rating at piston speeds of about 1000 ft. per min., the power required, at the shaft of the scavenging blower, is about 4 per cent of the total brake horsepower of this engine. With the increased piston speed a materially higher scavenging pressure will be required. In the absence of experimental data this increased power is not capable of exact determination. The velocity through the scavenging ports would be increased by about 60 per cent, which would require a scavenging pressure of about three pounds per square inch.

(*To be continued next month*)

Standard Diesel for Police Boat

Commissioners of the Metropolitan Police Department, Washington, D. C., have purchased a 100 hp. Standard Diesel engine. It will be installed in a 9½ knot, 55 ft. steel patrol and fire boat just ordered from the Spedden Shipbuilding Company of Baltimore, Md. Designs show her to be 55 ft. long, 11 ft. 9 in. molded breadth, 6 ft. 9 in. molded depth, with 5 ft. 3 in. draft. She is of the usual police patrol boat type, with towboat hull, pilot house and trunk aft over the engine room and officers' quarters.

Current Opinions of Our Readers

Timely Comments on Important Marine Matters. Publication of Letters Does Not Necessarily Imply Editorial Endorsement

To Build Liner in America

To the Editor of MOTORSHIP:

We are contemplating building in the United States a vessel similar to the motor liner SANTA MARIA in size and speed. We are securing prices covering Diesel, Diesel-electric, turbo electric and single reduction gear turbine. It will probably be some time before we come to any decision regarding form of propulsion to be used.

G. H. Carter,
President,
Grace Line, Inc.,
New York, N. Y.

Approves of Motorship's Recommendation

To the Editor of MOTORSHIP:

We heartily agree with the position you have taken on Steamer-Motorship Cost Comparisons in your August issue, and in calling for estimates and bids in the building of new tonnage, we shall unquestionably follow the idea you have set forth.

Robert C. Lee,
Vice-President,
Moore & McCormack Co., Inc.,
New York, N. Y.

Responsibility Up to Naval Architect

To the Editor of MOTORSHIP:

I am not technically qualified to answer the question raised in your August issue. We have the utmost confidence in Mr. Ferris, and have told him of our cargo and passenger requirements. And, we expect that he will design for us the most economical vessel for operation in our particular trade.

C. H. Pearsall,
Vice-President and General Manager,
Colombian Steamship Co.
New York, N. Y.

Steamer—Motorship Cost Comparisons

To the Editor of MOTORSHIP:

While conceding that the article published in your August number is interesting and presents much food for thought, we are not at this time disposed to make any modifications in our specifications as prepared for the new vessels. As stated by you, we are requesting bids based upon steam-driven propulsion and permitting prospective bidders to submit alternative bids for Diesel propulsion.

H. E. Frick,
Vice-President and General Manager,
The Export Steamship Corp.,
New York, N. Y.

Conversion of "Mount Vernon" and "Monticello"

To the Editor of MOTORSHIP:

Your letter of July 17th enclosing articles dealing with the forthcoming reconditioning of the liners MOUNT VERNON and MONTICELLO has been received, and I shall be glad to place them before the President. Thanking you for your thoughtfulness in sending these articles to him.

Everett Sanders,
Secretary to President Calvin Coolidge,
The Summer White House,
Superior, Wis.

Conversion Argument Has Great Force

To the Editor of MOTORSHIP:

Whatever one may think of the merits of the controversy—steam vs. internal combustion—it seems to me that Mr. Crowly has presented his argument with great force and cogency. In view of the Board's determination to offer the United States Lines for sale, with option of purchaser also taking the MOUNT VERNON and MONTICELLO, it is of course too early to say just what is ultimately going to be done in the case of these two vessels.

T. V. O'Connor,
Chairman,
U. S. Shipping Board,
Washington, D. C.

Senator W. L. Jones Gives His Views

To the Editor of MOTORSHIP:

I have read the articles on the proposed conversion of the MOUNT VERNON and MONTICELLO with very much interest. Of course you appreciate I am not an engineer, nor an expert in matters of this kind. I do want to see our merchant marine built up, and I would like to see our ships the equal of any ships in the world. I am willing to take whatever steps may be necessary to do this. I have thought that these two ships could and ought to be made into two splendid ships, but I did not know that they could be converted into the best motorships in the world. If this can be done at anything like a reasonable cost, I would like to see it done.

W. L. Jones,
Chairman,
U. S. Senate Committee on Commerce,
Washington, D. C.

Plans for "Mount Vernon" Include Diesel Installation

To the Editor of MOTORSHIP:

I am sure the Board fully appreciates the importance of this project and its bearing on the future of the American Merchant Marine. Fortunately, the plans and specifications on which bids for reconditioning are being invited provide for installation of Diesel engines, and I assure you that no one will be more interested than I in the results of these requests for bids.

Admiral H. I. Cone,
Commissioner,
U. S. Shipping Board,
Washington, D. C.

Opposed to Reconditioning Liners to Diesel Power

To the Editor of MOTORSHIP:

I have read with much interest Mr. Crowly's article on the conversion of the MOUNT VERNON and MONTICELLO, which he has presented in a very well thought out manner, but I am afraid I am not in agreement therewith, principally for the reason that I do not believe both these hulls are "sound and fit for more than another twenty years' service" in the North Atlantic trade. I am quite positive that the AGAMEMNON is not up to any such life as this, and I rather doubt it even for the MOUNT VERNON, which is in far better condition. While the actual *shells* of the vessels may be good for from twelve to fifteen years at most, some of the other features of their design make it seem to me highly improbable that the vessels can be real competitive North Atlantic units for longer than ten years at the most. For this reason I think it entirely unjustified to go to the expense of Diesels.

If Diesels could be put in for appreciably the same cost as steam, then of course I would have no objection, but with fuel oil where it is now and where it is likely to be for the better part of the ten-year life of these vessels, I question very seriously the advisability of the heavy expense of Diesels. I quite agree that this is to a considerable extent a matter of opinion, and of course do not let anything that I may have to say influence you in publishing in your own magazine whatever you think is the right road to go up as you see it.

Capt. R. D. Gatewood,
Manager, Maintenance and Repair Div.,
Merchant Fleet Corporation,
New York, N. Y.

[There is no question but that fuel oil will increase over the present "lowest-price-in-history" within a couple of years. Then the saving in fuel bills of the motorship over the oil-fired steamer will be much greater than it is today. Probable conditions five and ten years hence must be given due consideration when planning additions to a fleet of merchant vessels.—*Editor.*]

Senator Fletcher Advocates Government Conversion

To the Editor of MOTORSHIP:

I have read the articles in your August issue. They are both very good and timely. I do not claim to be an expert and am not in position to pass judgment on the difference between steam and Diesel, but I am strongly convinced that the United States ought to rebuild the MOUNT VERNON and MONTICELLO, and use the money provided by Congress for that purpose, and add them to the United States Lines. That was the intention and purpose of Congress.

I feel convinced now that the proper steps in that direction are not being taken, and I very much fear will not be pursued. This arises, I believe, by reason of orders of direction from higher up. Congress can pass the laws and make the provisions, but when it comes to executing them—although they be approved—there seems to be interference and obstruction. There is no doubt but a majority of the Shipping Board is in harmony with the purpose of getting the Shipping Board "out of business." The primary purpose of Congress—as expressed in the Merchant Marine Act of 1920 and reiterated and emphasized in the Act of 1928—was *to establish and maintain an adequate Merchant Marine.* The primary purpose as construed by those in charge of the execution and administration of the law is to *get all ships under our flag into private hands*, and to end, as speedily as possible, all ownership and operation of merchant ships by the Government or its agencies.

Determined and persistent pursuit of this policy will mean, in my judgment, that within ten years we will be back where we were in 1914 with regard to our merchant marine in overseas trade. Our producers, manufacturers, shippers, and all interests, will find themselves dependent upon our competitors in foreign markets for the delivery of our products. This is a pitiable, inexcusable situation for any self-respecting maritime nation to find itself in. It means a sacrifice of prosperity and the welfare of our people. This, from the standpoint of commerce and trade. With respect to our situation on the high seas in time of trouble and stress, still more fatal harm will be done by such a policy.

As I have heretofore insisted, the Shipping Board ought to stop this foolishness and cease advertising the ships for sale. They have done everything they could to induce private enterprise to take hold of shipping—offered to practically give the ships away, and tendered every inducement. Private enterprise declined. There is nothing to do but go on and operate the ships. They can't expect to build up the lines, the services and the business by constantly threatening to dispose of the ships. Congress has made provision looking to replacement, balancing the fleets, and doing whatever is necessary to maintain an adequate Merchant Marine. This is all ignored, a wrong construction is placed on the legislation, and the machinery is all set to get rid of the ships. I am steadfastly opposed to such a policy.

One passenger line—the United States Line—is operating at no material loss to the Government, but is serving our people and our country. It ought to be strengthened—not sacrificed. The new MOUNT VERNON and MONTICELLO should be added to that line. My impression is the motor power should be Diesel engines. The Shipping Board should be in position to determine that. They ought to go ahead just as Congress intended.

Duncan U. Fletcher,

U. S. Senate Committee on Commerce,
Washington, D. C.

No Bids to Build Diesel-Electric Ferries

To the Editor of MOTORSHIP:

No bids have been received August 1st for construction of ferryboats for use at the Manhattan State Hospital, Wards Island, New York City. It has therefore been necessary to change the date for receipt of proposals for machinery for said boats from August 15th to September 12th, 1928. The date required by the specifications for the delivery of the machinery has been changed to March 1st, 1929.

Wm. M. Acheson,
Chief Engineer,
State of New York,
Department of Public Works,
Albany, N. Y.

From Here and There

Fishing Vessels

The Bath Iron Works is well along with the three 123 ft. steel beam trawlers, all to be equipped with 400 hp. Fairbanks-Morse Diesels, for the Atlantic & Pacific Fish Co., Boston, recently described in MOTORSHIP.

A 73-foot scallop dragger built by W. A. Morse, at Friendship, for Cleveland Burns to be used out of New Bedford, is proving one of the ablest and speediest working boats recently built in a Maine yard. Her 60 hp. Fairbanks-Morse Diesel engine has driven her close to ten knots.

Captain Fred Bickford has taken two 24 hp. gasoline motors out of his schooner RICHARD J. NUNAN and installed a new 150 hp. Fairbanks-Morse Diesel. He has spent about $10,000 on his new power plant and a few other mechanical improvements calculated to make his vessel one of the fastest and ablest of the Portland, Maine, fleet.

Diesel Yachts

CAMARGO, the twin-screw, Diesel yacht, recently completed for Julius Fleischmann at Neponset, Mass., will visit California ports this fall, coming through the Panama Canal, and going from San Francisco to Honolulu and the Far East.

Cyrus H. K. Curtis' beautiful yacht LYNDONIA was the first pleasure craft to pass under the big lift span of the new Kennebec bridge which links the river shores between Bath and Woolwich. The LYNDONIA has two 1,000 hp. B. & W. Diesels.

Work is progressing rapidly on the twin-screw steel yacht VANDA, building at the Bath Iron Works Corporation for Ernest B. Dane, of Brookline, Mass. This craft is 240 feet long and one of the most notable pleasure boats to be constructed in a Maine yard. Her engines, as previously stated in MOTORSHIP, will be two 1500 hp. Bessemer airless injection Diesels. They are now in place and weigh 75 tons each.

Foreign Boats

13.57 knots was the trial speed attained by the 8,130 tons d.w.c. 3,600 i.hp. motorship SUD PACIFICO, just completed by Burmeister & Wain for the North-South America trade. Her cubic capacity is 496,200 ft. of grain. Cruising radius 30,000 sea miles on 1,070 tons of oil. Ship owners compare her performance and earning power with your own steamers! Dimensions 380 ft. b.p., 53 ft. 6 in. breadth, 38 ft. depth and 25 ft. 5½ in. draft. Trial power 3,988 i.hp. at 112 r.p.m.

Another 14-knot, 12,000 tons motorship has been ordered by the Holland-America Line from Wilton's shipyard, Rotterdam, for the North Pacific-Europe service.

Two 500 s.hp. Plenty oil engines turning at 300 r.p.m. propel the new 100 ft. tug CARLOS LUMB, just completed in England for towing barges from Buenos Aires to Ascuncion in the Argentine. Liebig's Extract of Meat Co., Ltd., are her owners.

TURICUM, a 10,850 tons d.w. tanker propelled by twin Werkspoor Diesel engines, and built on the Isherwood Bracketless system, has been launched in Holland for Norwegian owners.

NORTHERN PRINCE, EASTERN PRINCE, SOUTHERN PRINCE and WESTERN PRINCE are the names of four new Furness Prince Line 16-knot motorships now completing and to have B. & W. and Doxford Diesel engines respectively of 5,600 s.hp.

Domestic Items

Plans of the large motor tanker for the Union Oil Company of California are now completed and may shortly be issued.

The new tug JOHN F. CUSHING has been delivered to the Great Lakes Dredge & Dock Co., of Chicago, Ill. She is propelled by a 1,000 s.hp. Busch-Sulzer Diesel engine, and so is one of the highest-powered motor tugs in the country.

The wooden motorship OREGON, which has been idle since last September, re-entered active service from Seattle late in July carrying supplies to canneries maintained in Alaska by the Alaska Consolidated Canneries, and returning to the Washington port with canned salmon. The ship is owned by the Independent Navigation Company, of Seattle, and will be in service until the end of October.

The Shipping Board has decided to sell five of its ten remaining tankers, to be sold on a "as is, where is" basis, but with a provision for the submission of special bids whereby the buyer agrees to convert them to Diesel power. The following vessels are offered:

BRANDYWINE, 7,047 d.w. tons.
DARDEN, 7,500 d.w. tons.
GLADYSBE, 7,500 d.w. tons.
SALINA, 9,759 d.w. tons.
STOCKTON, 9,816 d.w. tons.

The Shipping Board points out that in the sale of a number of tankers in the past the purchaser has improved the ships by installing Diesel propulsion.

Erwin Ruehl has just returned to the United States after a two-months' trip in Europe studying high-powered Diesel engine construction on behalf of the Hooven, Owens, Rentschler Company, Hamilton, Ohio.

Electric Steam Heater Unit with Unusual Features

An electric heating unit which is designed to operate in connection with any type of steam or vapor radiator at an extremely low load factor has been announced for marine application by the Electric Steam Heater Company. In view of the electrical energy economy and structural simplicity claimed for the new device, it should be useful for a wide variety of heating duties on Diesel ships, yachts and workboats, where the production cost of current does not exceed one-half cent per kw. hour.

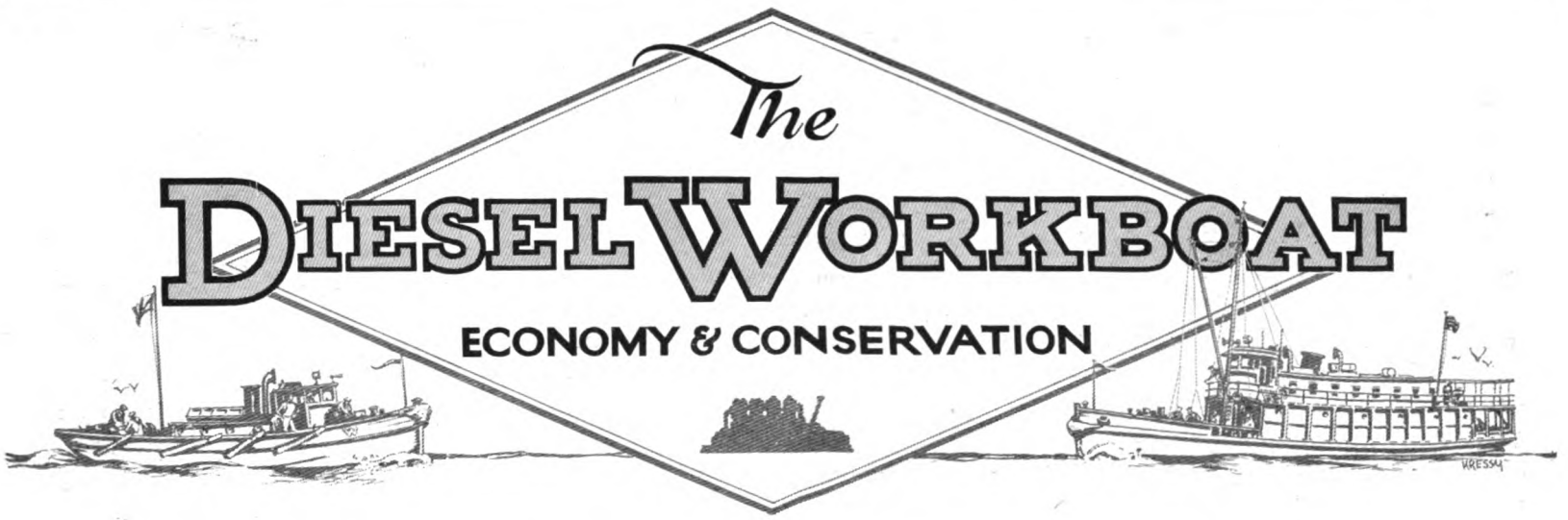
Basically, the heater is really a miniature electric boiler, consisting of an insulated cast-iron box fitted to any type of existing radiator—within this casing is a small water reservoir and an electrical element which is connected through a control switch to any suitably located base plug, conduit or lead to the regular ship lighting system.

In order to prevent a deposition of mineral matter, the relatively small quantity of water used is treated with a softening preparation supplied by the manufacturer. Since only "a half a glass of water a year" consumption is claimed by the manufacturer, the cost of this treatment is negligible.

When the heater is put into use, the maximum load of about 600 watts is drawn for about fifteen minutes, until the water in the unit is vaporized and has risen into the radiator in the form of extremely hot water vapor—when this vaporization stage is reached, the load on the heater automatically drops off to a minimum load of about 100 watts for radiators of a capacity up to 60 square feet.

From then on the amount of current required to maintain heat in the radiator is comparatively small—as the vapor cools, it settles back into the unit and is revaporized by the heating element.

The heater can be applied either to radiators which are already attached to existing heating systems, in which case the valve to the heating mains is closed and the base plug in the opposite end of the radiator is removed to receive the heating unit.



Sacramento River and Diesel Produce Carriers

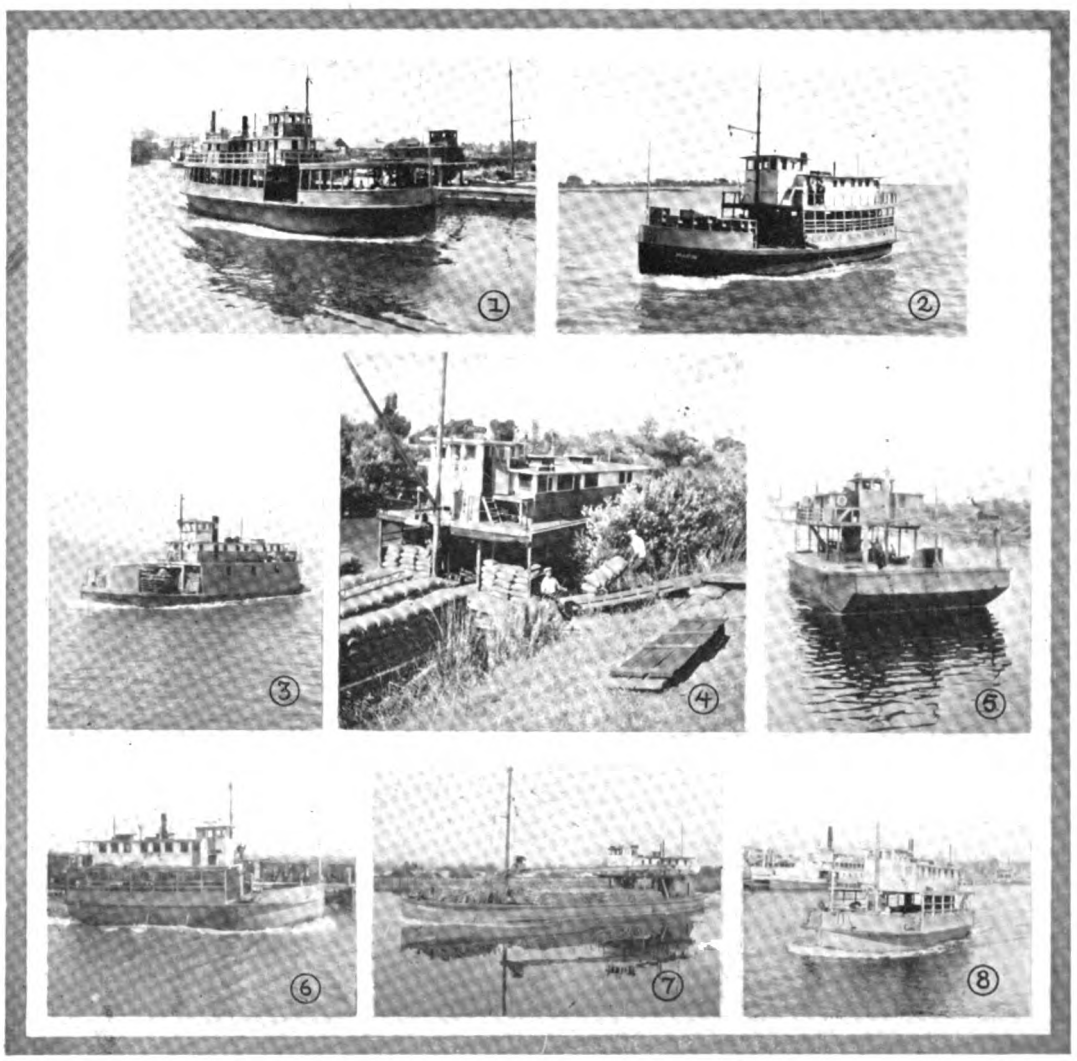
By R. E. Wood

LYING westerly from Stockton is the fertile delta region of the San Joaquin and Sacramento rivers, comprising a quarter million acres. This land is all leveed and actually below normal river level. In some cases the islands are bridged but mostly they are accessible only by boat. There are many miles of navigable streams throughout the region, and these vessels maintain continuous service. In the season when the harvest is on, there are hundreds of tons moved daily to local markets, rail terminals and out-bound ships on San Francisco Bay. The Diesel powered boats are doing this work in an ever increasing ratio.

There is a very considerable boating industry in this territory and a rapid trend toward adopting the Diesel motor. Only a few years ago the gas engine was in full sway operating on "distillate" at about 8 cents per gallon, but as this price rose and Diesel development was successful, the work of replacing went on rapidly.

In 1919 a material impetus was given to Diesel adoption in this vicinity. That year the Merchants Transportation Company built the M. V. JOHN with twin 60 Fairbangs-Morse engines and the tug HERBERT with 100 hp. of the same make. Being new vessels, and starting out with Diesels, awakened a vast amount of interest. Also the JOHN was the biggest carrier (other than steamers) in the district. Although powered with only 120 hp. total, the vessel carried 350 tons and ran from Stockton and vicinity to San Francisco on schedule each season. This involved passing through the river section and across San Francisco Bay, with plenty of tide and rough weather.

The writer and his partner at Stockton, California, own one of the thirteen Diesel tugs and Diesel workboats in operation. The tugs total 480 hp. and the workboats aggregate 740 hp. Many other craft come and go that are Diesel powered, but the above constitutes the "home fleet." The DOROTHEA, belonging to this partnership, was originally built 65 ft. long. Later 25 ft. were added, making the boat 90 ft. in length. The first engine was a 60 hp. Fairbanks-Morse manufactured in 1921. When the vessel was lengthened another engine of the same make developing 120 hp. was installed. This latter engine was built in 1926 and is of the direct reversing type. A 6 hp. hoisting engine and a 1½ hp. lighting set are also manufactured by Fairbanks-Morse Co. and are giving excellent service.



Sacramento river workboats: 1. *Swastika entering harbor;* 2. *Marin on asparagus run, outbound with empty boxes;* 3. *J. W. Higgins enroute to Port Costa with grain;* 4. *Dorothea loading grain off levee near Stockton;* 5. *Robert B. entering dock at Stockton;* 6. *Service passing Terminus, Calif.;* 7. *Sonoma enroute to San Francisco;* 8. *Meredith leaving Stockton*

The boat was originally contracted by F. L. Fulton shipyard, Antioch, California, who also carried out the work of reconstruction. It is a barge model of Diesel workboat used quite extensively in the vicinity of Stockton, and there are several similar boats built at the same yard now operating.

This shipyard is better know for its efficiency than its size. Construction is all of wood vessels. There are in addition to building ways an excellent set of Marine railway and equipment to 300 tons can be handled. Some of the recent work of this shipyard is tabulated below.

All of the above are new construction and successfully engaged in transportation in this district. This in addition to the lengthening of the DOROTHEA previously mentioned. Another reconstruction job worthy of note was the SONOMA, a square built barge which was lengthened, rebuilt with moulded bow, and fitted with twin engine Diesel power.

Of the thirteen vessels mentioned seven were built and

Boats Recently Built at the Fulton Yard

Name of Boat	Type	Power Plant	Length Feet	Gross Tons
Swastika	Freighter	Twin 75 H.P. Fairbanks-Morse	91	152
R. V. L. No. 2	Tug	165 H.P. Western-Enterprise	52	23
City of Napa	Freighter	120 H.P. Fairbanks-Morse	65	92
Crescent No. 1	Freighter	125 H.P. Atlas-Imperial	65	85
Marin	Freighter	110 Atlas-Imperial	65	92
8-Brothers	Freighter	75 H.P. Atlas-Imperial	65	90
Larkin No. 6	Freighter	75 H.P. Atlas-Imperial	65	100
Merit	Freighter	Twin 65 H.P. Atlas-Imperial	65	97

The "Home Fleet" at Stockton, California

Name of Vessel	Type	Power Plant	Owners	Length	GrossTons
Dorothea	Freighter	120 H.P. Fairbanks-Morse	Wood & Seitz	90	145
J. W. Higgins	Freighter	Twin 65 H.P. Atlas-Imperial	Higgins Trans Co.	84	151
Meredith	Freighter	75 H.P. Atlas-Imperial	Higgins Trans Co.	65	87
Merit	Freighter	Twin 65 H.P. Atlas-Imperial	Nickols Trans. Co.	65	97
Mildred	Freighter	60 H.P. Fairbanks-Morse	Empire Barge Co.	65	99
Monarch	Freighter	75 H.P. Atlas-Imperial	G. G. Wright	65	91
Robert B	Freighter	90 H.P. Atlas-Imperial	Merchants Trans. Co.	65	136
Service	Freighter	120 H.P. Atlas-Imperial	Stockton Trans. Co.	65	100
William C.	Passenger and Mail	40 H.P. Fairbanks-Morse	Colberg Motor Boats	51	15
Island Emperor	Tug	150 H.P. Atlas-Imperial	Island Trans. Co.	52	21
Island Empress	Tug	150 H.P. Atlas-Imperial	Island Trans. Co.	52	22
Matsu	Tug	150 H.P. Atlas-Imperial	Vehmeyer Trans. Co.	48	16
Vehmeyer No. 5	Tug	75 H.P. Atlas-Imperial 110 H.P.	Vehmeyer Trans. Co.	52	13

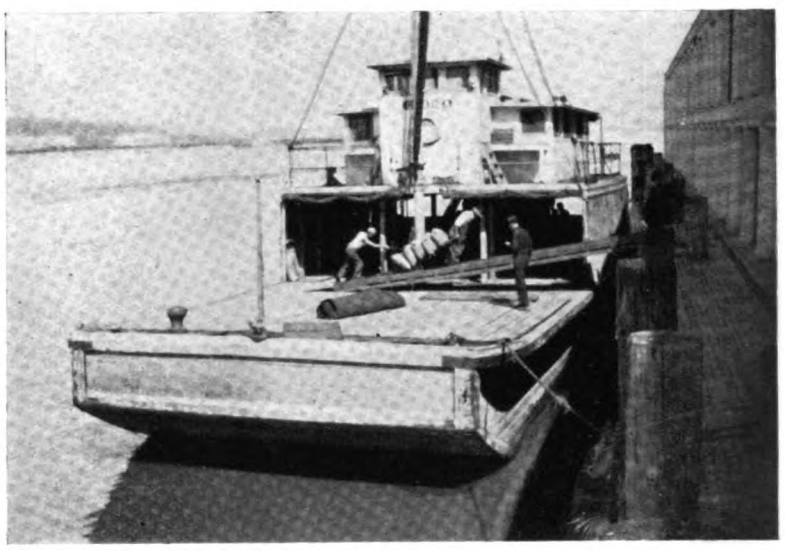
equipped with Diesel power in the first place and the other six, originally equipped with gasoline power, were later converted to Diesel. Eight of them were built in local yards, construction being divided between Stephens Bros. Ship Yard and Colberg Boat Works.

A deep water channel is now under construction from Stockton to the sea. This is a six-million dollar project financed by the City of Stockton, the State of California and the Federal Government. When completed Stockton will have a 26 foot deep channel to the Pacific via San Francisco and the Golden Gate. Although the total distance is approximately 90 miles there is actually less than 20 miles to be dredged. All funds are provided, surveys made and preliminary work prior to the digging is almost complete.

Steam to Diesel Conversion

The steam plant had been removed from the HERMOSA, former passenger carrier between San Pedro and Catalina Island, and a 450-hp., Fairbanks-Morse Diesel installed. This steamer was purchased recently from the Wilmington Transportation Company by William Maggio, San Pedro, manager for C. J. Hendry & Co., and will be used as a fishing tender.

Square bow Diesel power barges are popular



Discharging cargo from the Dorothea

Largest San Francisco Trawler Diesel Powered

The largest trawler operating out of San Francisco was launched July 14, when the CATHERINE PELADINI slipped from the ways of the General Engineering Corporation in Alameda. This wooden craft is 78 ft. long, 12 ft. 6 in. beam, 8 ft. 7 in. deep, and 7 ft. 6 in. draft. She is equipped with a 200-hp., Atlas-Imperial Diesel engine, built at Oakland, California, and has a 2-hp. engine of the same make for operating the water-circulation pumps in the tanks. In addition there are line pumps on the main engine, and power for the generator will be taken from the main shaft. Fuel tanks carry 2,400 gallons, giving her ability to stay outside for six days in ordinary weather. The boat is to be delivered late in August to the Peladini Fish Company of San Francisco and will be used in the halibut fisheries.

Another interesting wooden Diesel-driven fishing boats is the sardiner NEW ADMIRAL, launched late in July by the Cristofani & Anderson yard, San Francisco, for K. Hovden, of Monterey. This boat is 72 ft. long, 18 ft. beam, 9 ft. deep and 8 ft. draft, with a four-cylinder, 135-hp. Atlas Imperial Diesel engine, auxiliary power to be taken from the main shaft. Owing to condition of tides, both these large fishing boats were launched at night. NEW ADMIRAL will be in commission about the end of August, replacing the former ADMIRAL, one of Hovden's boats lost in a storm last year.

Tuxham Engine to Be Built in California

The Tuxham engine, a low compression oil engine for both marine and stationary operation, built by the Tuxham A/S Maskinfabrik, of Copenhagen, Denmark, is to be built for the United States, Canada and Mexico, by the F. A. B. Manufacturing Company, of Oakland, California, well known on the Pacific Coast as manufacturers of automotive equipment. Knud Freitag, president of the F. A. B. corporation, who has returned recently from Copenhagen, makes announcement of the license agreement with the Danish firm.

The engines will be built to exactly the same designs as in the Copenhagen shops, and the F. A. B. plant, to all intents and purposes, will be a branch of the main factory. According to Mr. Freitag, who was for some years with Burmeister & Wain, the Tuxham engines operate on the principle of guided ignition, which, it is claimed, gives greater smoothness of operation. The engines will be built in all sizes from 8 hp. up, in single and multiple cylinders. They operate on the two-stroke cycle, eliminating valve-grinding and push-rods. Crank-case compression is used, and trouble with the lubricating oil in the scavenged air is avoided by the use of roller bearings, sealed and packed in grease on the main crankshaft bearings, thereby insuring a virtually dry crank-case and what is claimed to be minimum consumption of lubricating oil. Governing is three per cent from full load to no load.

This engine operates on the ordinary Diesel engine oils, and, as it works on a low compression of not more than 150 pounds, its construction eliminates necessity for torches or other devices for heating the head. Freitag claims that the Tuxham engine operates with a fuel economy equal to that of Diesels with compressions of 350 to 400 pounds, and combustion pressures of 600 to 800 pounds. The weight of this engine is approximately the same as that of the gasoline engine of the same speed and power. For marine work, it is to be offered in single cylinders of 8, 10, 12, 16 and 24 hp.; in twin cylinders of 20, 24, 32 and 48 hp., and in larger numbers of cylinders up to 120 hp., with a complete line of reverse clutches supplied with the engines. Production of the Tuxham motors will if plans now under way by these people work out as expected.

Diesel Workboats On the Pacific Coast

THE San Diego Marine Construction Company is building two 95 ft. tuna fishing boats, to be equipped with Diesel engines of make not yet specified.

The first marine Diesel engine ever built in Canada came through its trials successfully when installed in the fish carrier PIKE'S PEAK at Vancouver, where it was built by the Cameron Company, Ltd. The engine is of 55 hp.

G. U. Troya, of Victoria, B. C., has taken delivery on a large Diesel-powered seiner, SEA HAWK No. 2, built by A. Bennett of Vancouver. Bennett is now building a 78-footer, Diesel driven, for Captain J. Fitzsimonds, of Nakusp, B. C., for use on the lake.

John and Jacob Sunde, of Seattle, are operating their recently completed halibut schooner, MERIT, with a two-cylinder, 40-hp., Bolinder's oil engine, supplied by the Richard Froeboese Company, Inc., agency of Seattle.

SARAH E., a trawler, 45 ft. long, has been delivered by the Astoria, Wash., Shipbuilding Co. to Captain C. H. Foster, of Aberdeen, Wash. She is driven by a 30 hp. Atlas-Imperial Diesel.

Cummins-Diesel motors have been made standard equipment on the 50 ft., 42 ft., 35 ft. and 28 ft. stock cruisers being put out by the Gordon-Olympic Motor Boat Corporation of Seattle, which is now employing 50 men at its plant there.

The Marine Exchange has opened its new lookout station at Los Angeles harbor, Wilmington and San Pedro, California. The top of the station bears a red beacon, 150 feet high, visible 25 miles at sea in clear weather and 10 miles in fog. Captain Paul Chandler is manager.

A three-cylinder, 100-hp., Western Enterprise Diesel is the power plant driving TAKLA, one of the newest designs of halibut "schooners," built recently for Chris Parkwell by A. M. Frantzen, at Vancouver, B. C. TAKLA is 66′ overall, 16′ beam, 7′ 8″ molded depth. Her complete cost is $30,000.

The California Sea Products Company, which conducts extensive whaling operations from shore stations on the California coast, announces that it will move its headquarters and permanent base from San Francisco to southern California, and will add three new small motorships to its fleet of whalers. Two of these will be killer boats, costing approximately $175,000 each, according to Captain F. K. Dedrick, head of the company, which now operates one motorship and several small steamers.

Frank Davey, of Hollywood, has taken delivery on his new 82 ft. Callis-designed, Diesel-powered cruiser from the Harbor Boat Building Company, at Wilmington, which also has completed repairs to E. E. Converse's 46 ft. Diesel-driven cruiser ENAO, incurred when she dragged her anchor and went ashore near Point McGue.

The newly-established boat-yard of Delano Brusstar, at Long Beach, is at work on three large bait boats, two of them 117 ft. 5 in. long, and the other 105 ft. The first two are sister ships, for the van Camp and Coast Fishing Company, to be driven by 400 hp. Fairbanks-Morse Diesels, with all electric auxiliary and refrigeration equipment. Their names will be GLORY OF THE SEAS and LIGHTNING, after two historic clippers of the days of the windjammers. The third fishing craft is for order of the West Gate Sea Products Company, of San Diego, and is to be named FLYING CLOUD, after another celebrated clipper. Her power plant has not been selected, but it will be Diesel.

Diesel installations in new boats and conversions for old ones are so numerous on the Pacific coast that it is virtually impossible to keep track of all of them. One of the interesting conversions is that of ANNIE W., owned and operated by the Anderson Towboat Company, of Seattle. Her 300-hp., steam plant was removed, and a 275-hp. Atlas-Imperial Diesel installed. The result, according to the Anderson firm, is 25 per cent more pulling power and about 35 per cent saving in operating costs.

Indications are that the Kamchatka Company, the $5,500,000 corporation formed by the Soviet government of Russia, will become the largest operator of Diesel-driven boats on this ocean. Having bought two Diesel-driven schooners, and two small steamers for conversion to Diesel power, this corporation is reported to be in the market for two other small steamers for similar conversion, and a fleet of 25 Diesel-driven fishing boats of large size. The Kamchatka Company has had men working in the halibut, salmon and tuna fisheries of the Pacific coast this summer, studying the boats and gear used and methods of operation of both.

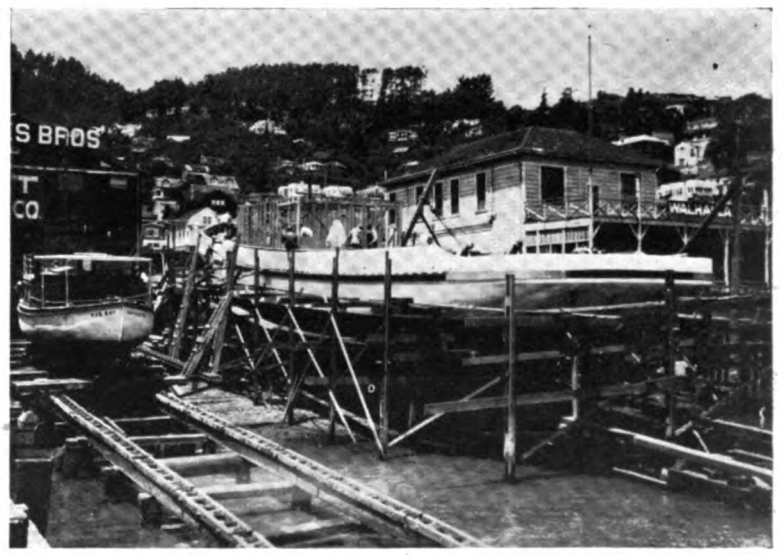
The first of five 46 ft. Diesel-driven workboats being built by Andrew Berg, of Seattle, for the Kanga Ranching Company, of Alaska, has been placed in commission and is on her way to one of the fur ranching posts of the company on the Aleutian Islands. She was christened KANAGA NATIVE. The other four are to be named UNAK NATIVE, ILAK NATIVE, TANAGA NATIVE and ADAK NATIVE. All five will remain in Aleutian waters, while a sixth vessel of the same type, but somewhat larger, the ISKUM, will be used to transport furs and supplies between the far northern ranches and the headquarters of the company in Seattle. Captain H. E. Bowman, president of the corporation, is in command of ISKUM, and in charge of the fleet of Diesel boats.

Largest Tuna Boats are Diesel Powered

Two of the latest designs in tuna-fishing boats for deep-sea service two or three hundred miles from the canneries, are being completed at the Nunes Boat Building Company's yard at Sausalito, just across the Golden Gate from San Francisco. One of these, MEDINA, is 115 ft. long, 23 ft. beam, and 10 ft. draft, with a 375 hp. Western Enterprise Diesel as propelling power plant, and an auxiliary Diesel, of make not named, to provide current for lights, refrigeration, anchor and seine hoists and other equipment. She is being built for Medina & Sons.

The other is FUNCHAL, 112 ft. 10 in. long, 25 ft. beam and 10 ft. draft, with a 350 hp. Atlas-Imperial Diesel as main power, and a 20 hp. Atlas-Imperial Diesel to provide current for electrically driven auxiliary equipment. She is being built for M. F. and M. S. Correia. Her fuel tanks hold 6,000 gals. and the capacity of her cork-lined hold, bait-box and bait-well will care for 150 tons of fish, kept fresh by the operation of a Lipman ice machine. Both these boats will work out of San Diego, for the Van Camp Sea Foods Company.

Great Northern under construction at Nunes Boat Yard, Sasalito, Cal. She is 115 *ft. long,* 23 *ft. beam and the largest tuna boat ever built*



Funchal, a sister ship to the Great Northern will be driven by a 350 *hp. Atlas-Imperial. Fish holds of both boats are cork insulated*

Two sister trollers, built for B. H. and J. H. Jensen, brothers, have been completed by the Schertzer shipyard, at Seattle. They are 44 ft. long, propelled by 50-hp. Washington-Estep Diesels.

Seattle port authorities have installed a 35-hp. Mianus Diesel engine in harbor patrol boat No. 2. Trials of the boat with the new engine, which replaces a gasoline motor, have been successful, according to John C. Beck, harbor manager.

The Bellingham Canning Company has taken delivery on a tender, 72 ft. x 17.5 ft. x 9 ft., with a three-cylinder, 150-hp. Western Enterprise Diesel engine. This boat was built at a cost of $47,000 by the Bellingham Marine Railways, of Bellingham, Wash.

A small Diesel tugboat having a length of 85 feet and a beam and depth of 17 and 5 ft. respectively is being built at the yards of Mojean and Ericson at Tacoma. She will be powered with a 240 horsepower Fairbanks Morse engine and will cost $40,000. The Magnolia Tugboat Company will be the owner of the new vessel.

The Hudson Bay Company's motorship BAYCHIMA is on her way to Herschel Island, on the polar coast of Canada, with trade goods for the historic company's posts. An unusual part of the cargo is a large number of knockdown houses which are increasing in popularity in the Arctic.

Eriksen's yard at North Vancouver, B. C., is completing for M. E. Crowell, a halibut boat 60′ overall by 14′ 9″ beam, with a 72-hp., two-cycle, Gardner oil engine. The same yard is constructing a combined halibut and purse-seiner for Captain C. E. Prince, to have a 54-hp., three-cylinder, Gardner oil engine. This boat will be 55′ x 14½′.

During the fiscal year which ended June 30, 1928, 297 motorized fishing boats were operated out of San Diego, to which port they brought 50,366,590 pounds of fish, as compared with 32,000,000 pounds for the preceding fiscal year, a gain of more than 18,000,000 pounds, or nearly 60 per cent.

Intercoastal operators at San Francisco have joined in the movement for all-night service through the Panama Canal, pointing out that, unless ships arrive at either end of the canal in early afternoon, they are not locked through until the following day. There are no physical obstacles to making the transit at night, according to these operators.

The Gordon-Olympic Motorboat Corporation, of Seattle, is building a 50-foot, deep-water cruiser, DIANA, to be driven by a six-cylinder, U-type, Cummins Diesel engine, for A. G. Ughetta, of Brooklyn. The cruiser will be shipped to her eastern owner on board an intercoastal freighter as soon as completed, probably late in June. All auxiliary equipment, including refrigeration, is electric, and floor and wall plugs are installed in every imaginable place on board.

The two-master auxiliary schooner EFFIE M. MORRISSEY has cleared from Seattle, for Bering Sea, with a party of scientists from the American Museum of Natural History on board. The adventurous little schooner, which is only 83 tons, has a 75-hp., Eastern Standard Diesel engine for auxiliary power, and carries six motor tenders of varying sizes, for landing parties. Captain Robert Bartlett, one of MOTORSHIP'S earliest readers, commander of the Peary polar ship, ROOSEVELT, is master of the MORRISSEY.

Sardine boat New Admiral just launched at San Francisco, Cal.

President John C. Piver, of the Pacific Inter-Club Yacht Association, has taken a party of friends on board his large schooner-rigged auxiliary, ELOISE, for a two-months' cruise in Alaskan and British Columbian waters. Prior to clearing from San Francisco, Mr. Piver had installed a 30-hp. Atlas-Imperial Diesel engine, and complete new radio sending and receiving sets. ELOISE was a contender in the famous ocean race from San Francisco to Tahiti, in 1925.

Peter Rask, at San Diego, whose yard recently completed ST. THERESE, 108 ft., and G. MARCONI, 83 ft., both tuna fishing boats and both Diesel driven, has started work on another 108-footer, not yet named, but of 24 ft. beam and 11 ft. depth, equipped with a 300 hp. Union Diesel, and carrying cork-lined fish boxes, with full refrigeration equipment and all-electric auixiliaries. ST. THERESE has a 375 hp. Western-Enterprise Diesel, and G. MARCONI is powered with a 200 hp. Atlas-Imperial Diesel.

Three standardized trollers, each 40 ft. long, driven by 20-hp. Atlas-Imperial Diesel engines, have been completed by S. E. Sagstad's yard at Ballard, Washington. A fourth, of the same size, with a 30-hp. Atlas-Imperial Diesel, has been built by James Crawford, at Gig Harbor, Wash. This fleet is for service in the fisheries of the Pacific Northwest. The Sagstad Yard also is completing a 43 ft. combination halibut boat and troller, with a 30-hp. Atlas-Imperial Diesel, and 34-ft. boat of the same type, with an 18-hp. Palmer gas engine.

Two of the largest wooden fishing boats yet laid down on the coast were launched recently by the Campbell Machine Company, at San Diego. The first to go down the ways was MARINER, 115 ft. over all, 25 ft. beam and 11 ft. draft, equipped with a 350-hp. Union Diesel, and built for Joseph Monise, for tuna fishing off the coast of Mexico. Auxiliary power for the 10-ton refrigerating plant, electric lights, and similar equipment, is provided by a 24-hp. Union Diesel engine, while a Fordson tractor engine handles the bilge, bait-tank and fish-hold pumps. Cruising radius of 5,000 miles and capacity of 150 tons of refrigerated fish are provided. The other boat is a sister ship to MARINER, christened CALIFORNIA, and built for Manual Silvers & Son, for the same kind of fishing in the same waters. This ship is equipped with a 300-hp., direct-reversible Union Diesel engine. ST. VERONICA, sister ship, including the power plant, to CALIFORNIA, has been launched from the same plant for John Cardosa.

The California Packing Corporation has entered the southern California fisheries with the purchase of the Seacoast Canning Company at San Pedro. The fleet of the new corporation embraces 400 motorboats, of which about 175 have Diesel power. More than $100,000 is being expended in improvements to plant and fleet.

The Yacht & Motor Sales Corporation at Wilmington, California, has just put the 90 ft. Diesel-driven cruiser GENTRY in commission for charter to parties for long cruises along the California and Mexican coasts. This fine cruiser has accommodations for fifteen guests and a crew of six. Ernest Grill has been appointed sales agent for this corporation at Newport Harbor, California.

Alaska fisheries, exclusive of whaling, employed 11,030 persons this summer, in the actual taking of fish, of whom rather more than 70 per cent worked on motor-driven craft from large auxiliaries to dories and skiffs equipped with outboard motors. Total value of the packed product of these fisheries is placed at $40,163,300. The small Diesel engine was introduced in this field last year, and is steadily increasing in numbers and popularity.